DEPARTMENT OF AGRICULTURE
CANADA

# ANNUAL REPORT

OF THE

# FOREST INSECT AND DISEASE SURVEY

FOREST BIOLOGY DIVISION
SCIENCE SERVICE

1955

Published by Authority of the Rt. Hon. JAMES G. GARDINER, Minister of Agriculture
Ottawa, Canada

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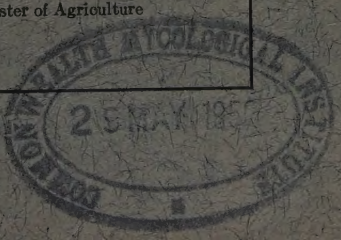

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## FOREWORD

The national organization of the Forest Insect and Disease Survey has undergone a number of changes in territorial responsibility during recent years but only slight changes were made in 1955. A new laboratory was completed at Corner Brook, Newfoundland, making it unnecessary to have forest insect material from Newfoundland directed to the Fredericton Laboratory. This change is reflected in the Atlantic Provinces report where a special section dealing with Newfoundland conditions is presented for the first time. Forest Disease Survey activities for the Atlantic Provinces remained centered at Fredericton.

In 1955 a somewhat clearer definition of responsibilities for forest insect surveys in Quebec was attained. The province-wide general forest insect survey is the primary responsibility of the Quebec Bureau of Entomology. The Forest Biology Division's program in Quebec is concerned primarily with research problems and special surveys necessary for proper orientation of the research program. The results of the provincial survey unfortunately were not available for inclusion in this report; only the results of restricted surveys by Divisional officers are presented.

A number of staff changes involving Survey personnel occurred in 1955. W. A. Reeks, who has long been associated with the Survey in the Atlantic Provinces, assumed the duties of Officer-in-Charge of the Winnipeg Laboratory. R. S. Forbes is his successor at Fredericton. The transfer of Survey personnel from the Indian Head Laboratory was completed during the year.

Equipment and facilities necessary for the conduct of the Forest Insect and Disease Survey have now been realized in most regions. There were, however, some important additions in 1955. The completion of the Corner Brook Laboratory has already been mentioned. New ranger headquarters were erected at Hudson Bay, Saskatchewan, and at Williams Lake and Wasa Lake, British Columbia. A boat suitable for navigation in the large rivers and lakes of northern Alberta and the Northwest Territories was put in service in 1955.

The individual reports which follow show that a great variety of forest insect problems occurred in Canada in 1955. From a national point of view, two species in particular stand out, the spruce budworm and the larch sawfly.

The spruce budworm remained the dominant forest insect problem in New Brunswick and eastern Quebec and the large-scale aerial spray operations that have been in progress since 1952 were continued. Egg counts indicate a continuation of the outbreak in 1956. Outbreak conditions also persisted on Cape Breton Island and in parts of Newfoundland. The large-scale outbreak persisted in northwestern Ontario. It increased in area and extended into eastern Manitoba. An extensive outbreak of 1-year-cycle budworm on white spruce occurred along the Mackenzie River system for nearly 400 miles north of Fort Simpson, N.W.T. Severe defoliation continued in the Fraser-Nahatlatch area of southern British Columbia. Population levels of the 2-year-cycle budworm in British Columbia could not be satisfactorily appraised in the "non-flight" year.

Larch sawfly infestations followed the general trend that has become apparent during recent years. Population levels declined further in Central Canada where the outbreak first appeared; active infestations were found farther to the east and to the west. The outbreaks in Newfoundland continued. For the first time since 1942, increased numbers of larch sawflies were collected in the Maritime Provinces. In Ontario, the highest population levels were in the northern and central regions; increased numbers were observed in the southeast and further marked declines in the northwest. These latter declines paralleled those in Manitoba and Saskatchewan. The only extensive severe defoliation recorded in areas surveyed by the Winnipeg Laboratory was in the

Churchill River drainage in northern Saskatchewan. In the older outbreak areas of Manitoba and Saskatchewan, mortality of larch trees is becoming apparent; a similar condition was reported in east-central Alberta where the outbreak first developed several years ago. Farther west in Alberta, defoliation was wide-spread and generally severe. Light infestations were recorded in the Prince George region of British Columbia.

Other noteworthy insect conditions were as follows: Forest tent caterpillar outbreaks almost completely subsided in 1955. Low hatch and adverse weather greatly reduced numbers in Interior British Columbia. All that remained of the widespread outbreaks of a few years ago was a relatively small area of heavy defoliation in northeastern Ontario, and a light infestation on the Saanich Peninsula of Vancouver Island. The pine root-collar weevil which recently has become of considerable concern to plantation owners in the Lake Simcoe area of southern Ontario, was found for the first time near Sault Ste. Marie and in the Sandilands Forest Reserve in southeastern Manitoba. The black-headed budworm was the principal defoliator in coastal British Columbia as marked increases occurred in the central mainland area and on the northern part of Vancouver Island. In Interior British Columbia, the Douglas-fir beetle continued to be the most serious insect problem.

The Forest Disease Survey continued on much the same basis as in recent years except for some change of emphasis; less attention was concentrated on the few special diseases of national importance in favor of numerous disease problems of regional interest. Sufficient data have now been obtained to delimit the geographic and host ranges of the diseases originally selected for national attention. Other items of particular interest reported in 1955 were: the reduced incidence in some regions of foliage diseases, owing to the extremely dry weather conditions; the commonness of the spruce rust, *Chrysomyxa ledicola* (Peck) Lagerh., in all regions; the first known collection in Ontario of the mistletoe, *Arceuthobium americanum* Nutt., on jack pine in the Kenora District; and the discovery of *Fomes annosus* (Fries) Cooke in two plantations in southern Ontario.

In addition to numerous reports, Survey officers published a number of technical papers during 1955. These are listed below. Copies are available from the authors or Divisional Headquarters at Ottawa.

Lindquist, O. H.—A technique for pinning and spreading small Microlepidoptera.—Can. Ent. in press.

McGuffin, W. C.—Some larvae of the genus *Itame* Hubner (Lepidoptera: Geometridae). Can. Ent. in press.

McGugan, B. M.—Certain host-parasite relationships involving the spruce budworm. Can. Ent. 87: 178-187.

Prentice, R. M.—The life history and some aspects of the ecology of the Large Aspen Tortrix, *Choristoneura conflictana* (Wlkr.) (N. Comb.) (Lepidoptera: Tortricidae). Can. Ent. 87: 461-473.

Ross, D. A.—Differences in the pupae of *Feralia comstocki* Grt. and *F. jocosa* (Gn.) (Lepidoptera: Noctuidae). Can. Ent. 87: 275–276.

Ross, D. A. and D. Evans—Annotated list of forest insects of British Columbia. Part III—*Eupithecia* spp. (Geometridae). Proc. Ent. Soc. of B.C. in press.

Ross, D. A. and D. Evans—Annotated list of forest insects of British Columbia. Part IV *Hydriomena* spp. (Geometridae). Proc. Ent. Soc. of B.C. in press.

Underwood, G. R.—The external morphology of five forms of *Pineus pinifoliae* (Fitch) (Homoptera: Phylloxeridae). Can. Ent. 87: 201-209.

Wong, H. R.—Larvae of the Nearctic species of *Anoplonyx* (Tenthredinidae: Hymenoptera). Can. Ent. 87: 224-227.

Much of the information presented in the following sections is of a summary nature. Further detail is available through the undersigned or the regional laboratory concerned.

B. M. McGUGAN, *Co-ordinator,*
*Forest Insect and Disease Survey.*

# ATLANTIC PROVINCES

## FOREST INSECT SURVEY

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### INTRODUCTION

The Forest Insect Survey in the Atlantic Region was continued with emphasis on the description of current attacks, the recording of insect population trends, and the gathering of data on distribution, habits, and natural control. The assistance and co-operation provided by personnel of Forest Protection Ltd., the New Brunswick Forest Service, the Department of Lands and Forests of Nova Scotia, the Newfoundland Forest Protection Association, the National Parks Service, and Pulp and Paper Companies is gratefully acknowledged.

Increased facilities were provided by the construction of a new laboratory and insectary in Corner Brook. Formerly, collections in Newfoundland were sent to Fredericton for analysis and rearing, but in 1955, these were handled at Corner Brook. Monthly and annual statements on the status of insects in Newfoundland were issued separately from Corner Brook, and a summary of conditions in Newfoundland, by W. J. Carroll, is included as a separate section of this report.

For several years, the sampling of miscellaneous defoliators on coniferous trees in the Atlantic Region has been mainly by beating the foliage with a 10-foot pole, and collecting the insects which fell on a 7-by 9-foot sheet. In this method, the population is expressed as the average number of larvae per tree sample. The technique was practical for general collecting by co-operators, and is useful in suggesting population trends in cases of light and fairly uniform infestation. To overcome the shortcomings of this general technique, a number of more satisfactory sampling methods are now employed for certain specific insects. These methods will be referred to in the text which follows.

The total number of insect collections was 4,015. These were distributed by provinces as follows: New Brunswick, 1,182; Nova Scotia, 1,680; Prince Edward Island, 113; Newfoundland, 1,040.

Special reports on insect conditions numbered 326.

The distribution of collections by major tree species is as follows:

| Coniferous trees | Collections | Broad-leaved trees | Collections |
|---|---|---|---|
| Spruce | 1,019 | Oak | 399 |
| Balsam fir | 985 | Birch | 289 |
| Larch | 330 | Poplar | 169 |
| Pine | 128 | Maple | 87 |
| Cedar | 19 | Elm | 33 |
| Hemlock | 17 | Beech | 18 |

| | |
|---|---|
| Miscellaneous hosts | 522 |
| Grand Total | 4,015 |

[1]Forest Biology Laboratory, Corner Brook, Newfoundland.
[2]Forest Biology Laboratory, Truro, Nova Scotia.

## MARITIME PROVINCES

***Spruce Budworm,*** *Choristoneura fumiferana* (Clem.).—Aerial and ground surveys of spruce budworm conditions in the Maritime Provinces continued to be an important part of the activities of the Forest Insect Survey. Aerial surveys of the main outbreaks in New Brunswick and Nova Scotia were carried out with the co-operation of Forest Protection Ltd. and the Nova Scotia Department of Lands and Forests. These surveys required approximately 125 flying hours in New Brunswick and six hours in Nova Scotia. In addition to extensive ground surveys in northern New Brunswick, larval sampling, defoliation estimates, and egg sampling were carried out at nearly 500 locations along motor roads and trails in New Brunswick, Nova Scotia, and Prince Edward Island. The infestation classes used in the accompanying map are similar to those described in the 1954 Report. The infestations within the areas sprayed at different times between 1952 and 1955 are extremely variable because of varying reinfestation from moth flights and local increases following spraying. Conditions on the sprayed area are therefore not shown on the map, but will be reported elsewhere by F. E. Webb.

The areas of moderate to severe infestation in New Brunswick remained at about 13,000 square miles. Slight extensions of the main outbreak occurred to the south and in a southeasterly and southwesterly direction. The southerly boundary of the main area of severe current defoliation included the McKiel Lake area and extended approximately from McGivney to Kent Junction, then southeast to include the Harcourt and Cocagne areas. The western boundaries of the main outbreak remained virtually unchanged. In the northeast, the loss of new foliage was generally moderate to severe in areas of high balsam fir content outside of the sprayed areas. In southeastern New Brunswick, moderate current defoliation of balsam fir occurred in a few areas including Gallagher Ridge and Lower Aboujagane, Westmorland County, and Lakeview and Bennett Lake in the Fundy National Park. The southern boundary of the lightly infested area was much the same as in 1954. Random sampling indicated some decrease in larval numbers.

High egg-mass counts in most unsprayed areas of northeastern New Brunswick indicate continuing high populations there in 1956. As a result of heavy moth flights in central New Brunswick, egg counts in most areas sampled were higher than in 1954. The highest increases were found southwest of Boiestown, York County. These may result in a significant southward extension of the infestation in 1956.

In parts of eastern Nova Scotia, white spruce trees supported higher populations than balsam fir trees. The infestation areas on the mainland were reduced and on Cape Breton Island slightly enlarged from 1954. Larval collections indicated a reduction in numbers in all counties except Guysborough and Inverness. The most severe damage on the mainland occurred on a few white spruce trees near Arisaig, Antigonish County, where up to 40 per cent of the new needles were destroyed.

On the western coast of Cape Breton Island the loss of new foliage in old-field white spruce stands varied from a trace at Port Hastings to 90 per cent near Grand Etang. At Strathlorne, where defoliation was observed in 1951, and some spruce trees have died from a combination of factors including the budworm, the current defoliation was about 70 per cent. On the northern peninsula balsam fir was more heavily infested than spruce. Defoliation of balsam fir ranged from light near Strathlorne and North River to nearly 90

per cent at the Clyburn and Cheticamp river valleys. In the French, MacKenzie, and North Mountain areas and on the plateaus, large numbers of balsam fir trees are dead or dying from a number of factors including the balsam woolly aphid, the black-headed budworm, and the spruce budworm. Some large patches of dead balsam fir trees near Cape North suggest past outbreaks of the hemlock looper.

Egg sampling suggests that lower populations will occur in almost all areas of eastern Nova Scotia in 1956, except for a few locations in Antigonish County and southwestern Victoria County. Elsewhere in Nova Scotia, only small numbers of eggs and larvae were collected and no severe defoliation was observed.

On Prince Edward Island, spot infestations of severe intensity continued, particularly in balsam fir stands in the northern and central part of the Island and in the southern peninsula of Kings and Queens counties. Egg mass counts were generally lower than in 1954 except at one or two points in Prince and Quee ns counties.

| | Reports | Collections | Larvae per tree sample | |
|---|---|---|---|---|
| | | | Av. | Dev. from 1954 |
| New Brunswick | 35 | 303 | 12·1 | — 9·5 |
| Nova Scotia | 18 | 164 | 23·9* | +17·1* |
| Prince Edward Island | 2 | 38 | — | — |

***Winter Moth,*** *Operophtera brumata* (L.).—Collections of the winter moth in Nova Scotia in the last few years indicate that the insect is spreading slowly to the east and north. In 1955, the insect was found as far east as Upper Stewiacke, Colchester County; Mount Thom, Pictou County; Ecum Secum, Halifax County and north to Masstown and Glenholme. The accompanying map shows the known distribution, which has enlarged considerably over the limits shown in this report in 1951. The insect occurs along the coast from eastern Halifax County to Yarmouth and inland through most of Queens, Lunenburg, Hants, and Halifax counties and parts of Kings, Annapolis, Colchester, and Pictou counties. No collections of this species have been reported elsewhere in North America. The principal trees attacked are red oak, apple, elm, maple, and basswood.

The most severe infestations in 1955 occurred from the head of St. Margarets Bay to Mahone Bay, and near Milton, Queens County. A severe localized outbreak occurred at Grand Pre where defoliation of unsprayed apple orchards, elm, ash, and maple approached 80 per cent. Defoliation was less severe in some of the older outbreak areas, particularly between Liverpool and Bridgewater and inland to New Germany and Pleasant River.

Population sampling techniques, natural control, and biological control are being studied. Small numbers of a larval parasite, *Apanteles acaudus* Prov., were reared from field collections. Several small shipments of parasites from Europe were released near Bridgewater in co-operation with the Insect Systematics and Biological Control Unit of the Entomology Division. These included *Phobocampe crassiuscula* Grau., *Cyzenis albicans* Fall., *Lypha dubia* (H.), *Phorocera obscura* Fall., and *Pimpla turionellae* (L.).

| | Reports | Collections |
|---|---|---|
| Nova Scotia | 4 | 362 |

*These figures reflect increased sampling in areas of high population and do not represent a general increase.

***Fall Cankerworm,*** *Alsophila pometaria* (Harr.)—Light to moderate defoliation of elm trees occurred in Fredericton and in the Sheffield area. Light defoliation occurred at Chipman, Queens County and Carroll's Crossing, Northumberland County.

Along the south shore of Nova Scotia the insect was often associated with the winter moth. Population counts from sampling stations showed that the proportions of fall cankerworm to winter moth were as follows: Bridgewater, 1:20; Mahone Bay, 1:65; Chester Basin, 1:150 and at Timberlea, near Halifax, 2:1.

The outbreak, between Bedford and Waverley, where red oak, maple, and gray birch were completely defoliated in 1954, continued with little change in severity, despite rather high numbers of the egg parasite, *Trichogramma minutum* Riley. A small, but severe infestation near Wellington Station, Halifax County, also continued for the second year.

| | Reports | Collections |
|---|---|---|
| New Brunswick | 2 | 2 |
| Nova Scotia | 4 | 51 |

***Balsam Woolly Aphid,*** *Adelges piceae* (Ratz.).—The distribution of this insect in the Maritime Provinces remained unchanged in 1955. The "gout" form of injury continued to be more common than "stem attack". In New Brunswick, plot tallies near Grand Anse, Gloucester County showed a 14 per cent increase in dead trees in 1955. This mortality was attributed to "gout" as no "stem attacks" had been recorded since 1949. New heavy "stem attacks" occurred at Hacheyville, Gloucester County, near Doaktown and Boiestown and in the Grand Lake Game Sanctuary. Retallies of plots in central and southern New Brunswick indicated a slight reduction in "stem attack" but little or no change in the proportion of trees affected by "gout".

In northwestern Nova Scotia moderate to severe "stem attacks" persisted at Harrison Settlement, Cumberland County, at Nuttby and near McCallum Settlement, Colchester County. On the eastern mainland, recent severe "stem attacks" occurred near Trafalgar, Guysborough County, on the Musquodoboit-Sheet Harbour Road, Halifax County, at Kemptown and Earltown, Colchester County and near Waterville, Pictou County. "Gout" injury was severe at Kemptown and Earltown.

The accumulated effect of attacks by this insect on Cape Breton Island have resulted in a serious general deterioration and considerable mortality of balsam fir. The insect undoubtedly has contributed to the dying of trees in certain areas of spruce budworm attack.

For the first time in three years a light "stem attack" was found in Prince Edward Island, near Albion Cross, Kings County. "Gout" is common in the Province.

Releases of introduced predators and studies of their establishment were continued in co-operation with the Insect Systematics and Biological Control Unit. Four species have become established but it is too early to evaluate their ultimate control value.

| | Reports | Collections |
|---|---|---|
| New Brunswick | 7 | 1 |
| Nova Scotia | 8 | 2 |
| Prince Edward Island | 1 | — |

***Eastern Hemlock Looper,*** *Lambdina fiscellaria fiscellaria* (Guen.).—This insect was common throughout the Maritime Provinces, but no infestations were reported.

| | Reports | Collections | Larvae per tree sample | |
|---|---|---|---|---|
| | | | Av. | Dev. from 1954 |
| New Brunswick | — | 20 | 0·7 | 0 |
| Nova Scotia | 8 | 36 | 0·9 | −3·1 |

***Pine Leaf Chermes,*** *Pineus pinifoliae* (Fitch).—Large numbers of galls on red spruce and severe infestations on new shoots of white pine occurred at Upper Gagetown, Queens County; at Babbit and the Acadia Forest Experimental Station, Sunbury County; in the woodlot of the University of New Brunswick, Hanwell Road, Bear Island and Scotch Lake, York County; and at Glazier Lake, Madawaska County. Elsewhere in New Brunswick populations were light to moderate. The drooping of white pine shoots and shoot mortality were severe at Bear Island. In general, the injury to pine was less than expected from the number of individuals migrating from the spruce.

White pine trees adjacent to red spruce trees are most susceptible to severe infestations of this insect.

| | Reports | Collections |
|---|---|---|
| New Brunswick | 14 | 28 |
| Nova Scotia | 1 | — |

***Beech Scale,*** *Cryptococcus fagi* (Baer.).—Little change was observed in the distribution of the beech scale in New Brunswick where it is known to be present as far north as Drummond and Sisson Ridge in Victoria County and at Dundee and Glenwood in Restigouche County. In the northeastern part of the Province, light attacks continued with little change in intensity. Plot tallies near Fredericton and in Charlotte County showed slight decreases in scale attack and no change in the number of cankered trees or tree mortality compared with 1954.

Most of the beech trees on plots in Nova Scotia were heavily cankered and supported light stem attacks. Little tree mortality occurred in 1955.

Light to moderate attacks were common on young and cankered trees in Prince Edward Island.

| | Reports | Collections |
|---|---|---|
| New Brunswick | 3 | 1 |
| Nova Scotia | 6 | — |
| Prince Edward Island | 1 | — |

***Larch Sawfly,*** *Pristiphora erichsonii* (Htg.).—Only one or two collections per year have been taken in the Maritime Provinces during the last few years. Eight collections were received in 1955 and a light infestation occurred near Black Point, Halifax County, N.S. Some 340 larvae were picked from a few trees which suffered about 10 per cent defoliation.

| | Reports | Collections | Larvae per tree sample | |
|---|---|---|---|---|
| | | | Av. | Dev. from 1954 |
| New Brunswick | 5 | 4 | 1·2 | — |
| Nova Scotia | 4 | 4 | 1·6 | — |

***Larch Casebearer,*** *Coleophora laricella* (Hbn.).—Except for light browning in larch stands in some areas of Colchester, Halifax, Lunenburg, Shelburne and Digby counties of Nova Scotia, population levels of this insect remained low in the Maritime Provinces in 1955.

For several years, a population sampling technique has been used in which the sampling unit is the number of cases on 30 fascicles of needles on 1-year-old

shoots, with a correction factor for fascicle size. In 1955, 20 trees were sampled at each of 49 sampling stations in New Brunswick and Nova Scotia. A decrease in casebearer numbers occurred in all areas except southern New Brunswick where population levels increased over tenfold from 1954. A summary of general population levels by districts follows:

| District | No. sampling stations | Av. no. cases per sample | Population changes in 1955 |
|---|---|---|---|
| Southern New Brunswick | 14 | 0·2 | General increase |
| Northeastern New Brunswick | 8 | 0·2 | Slight decrease |
| Northwestern New Brunswick | 4 | 0·4 | Slight decrease |
| Eastern Nova Scotia | 8 | 0·5 | General decrease |
| Western Nova Scotia | 15 | 1·3 | Slight decrease |

| | Reports | Collections |
|---|---|---|
| New Brunswick | 7 | 17 |
| Nova Scotia | 2 | 28 |
| Prince Edward Island | 1 | — |

***European Spruce Sawfly,*** *Diprion hercyniae* (Htg.).—The population levels of this sawfly remained low throughout the Maritime Provinces in 1955. The virus disease and introduced parasites were recovered from collections taken in widely separated areas in New Brunswick and Nova Scotia. *Drino bohemica* Mesn. continued to be the most commonly recovered parasite.

| | Reports | Collections | Larvae per tree sample | |
|---|---|---|---|---|
| | | | Av. | Dev. from 1954 |
| New Brunswick | 2 | 47 | 0·9 | +0·1 |
| Nova Scotia | 9 | 91 | 0·7 | −0·3 |

***Yellow-headed Spruce Sawfly,*** *Pikonema alaskensis* (Roh.).—Moderate to severe defoliation of white spruce reproduction in pastures and old fields was reported from Allandale, Canterbury, First Eel Lake, Hainsville, Zealand, Burtts Corner, and Scotch Lake in York County, New Brunswick. At Scotch Lake, where moderate to severe defoliation occurred in 1953 and 1954, up to 90 per cent of the new foliage was destroyed and many trees showed no needles on the top third of the crown. Elsewhere in the Maritime Provinces, this sawfly was present only in small numbers.

| | Reports | Collections |
|---|---|---|
| New Brunswick | 7 | 23 |
| Nova Scotia | 9 | 29 |

***Black-headed Budworm,*** *Acleris variana* (Fern.).—Small numbers of larvae of this species were collected in New Brunswick and Nova Scotia. It was not found in Prince Edward Island.

| | Reports | Collections | Larvae per tree sample | |
|---|---|---|---|---|
| | | | Av. | Dev. from 1954 |
| New Brunswick | 1 | 37 | 0·5 | 0 |
| Nova Scotia | 4 | 7 | 1·2 | +0·6 |

***European Pine Shoot Moth,*** *Rhyacionia buoliana* (Schiff.).—This insect was found on mugho pine and red pine in Fredericton, N.B. In Nova Scotia, severe infestations continued on pine in nurseries near Truro and on pines near

Mahone Bay and in Halifax. In a plantation near Charlottetown many of the red pine trees which had been lightly to moderately infested for three years were removed. The remaining trees were sprayed and the insect was present only in small numbers.

| | Reports | Collections |
|---|---|---|
| New Brunswick | 1 | 3 |
| Nova Scotia | 3 | — |
| Prince Edward Island | 1 | 1 |

***Satin Moth,*** *Stilpnotia salicis* (L.).—The satin moth infestations, reported since 1950 on Carolina and silver poplar in the Upper St. John River Valley decreased in area and severity in 1955. Defoliation ranged from 25 to 75 per cent on Carolina poplar trees near Salisbury, Milltown, Cocagne, Douglastown, and Campbellton. At Campbellton, where about 75 trees in a cemetery were affected, a large number of egg masses and relatively few parasite cocoons suggest that high populations will occur in 1956. A few planted poplar trees at Landry and East Bathurst, Gloucester County, were less severely attacked.

In Nova Scotia, the satin moth caused no damage except for light defoliation of poplar trees at Port Hood, Inverness County.

| | Reports | Collections |
|---|---|---|
| New Brunswick | 16 | 24 |
| Nova Scotia | 1 | 1 |

***White-marked Tussock Moth,*** *Hemerocampa leucostigma* (A. & S.).—The only outbreak of this insect in New Brunswick occurred in a small area near Mackins Lake, St. John County, where defoliation of mixed hardwoods was light to moderate.

In Nova Scotia, the infestations on yellow and white birch, reported in the northern part of Cape Breton Island since 1953, have subsided. Severe defoliation occurred on white birch, yellow birch, balsam fir, apple, and larch between Craignish Mountain and Grand Anse, becoming moderate along the eastern shore of Bras d'Or Lake and light towards Sydney. The outbreak, which developed near Kemptown in 1953 and increased in area and intensity in 1954, continued in 1955. Birch and other hardwood hosts as well as balsam fir were defoliated in many areas of Cumberland and Colchester counties. The most severe defoliation occurred between Collingwood Corner and Castlereagh and from Moose River to Mapleton. Less severe outbreaks were reported on similar hosts near Goshen and in the Grant Lake-Mulgrave area of Guysborough County.

A wilt disease of larvae was common in most of the infested areas in eastern and central Nova Scotia.

| | Reports | Collections |
|---|---|---|
| New Brunswick | 2 | 10 |
| Nova Scotia | 12 | 73 |

***Birch Skeletonizer,*** *Bucculatrix canadensisella* Chamb.—The severe infestations on white and gray birch which occurred in northwestern New Brunswick in 1953 and 1954 were much reduced in intensity in 1955. Elsewhere in the Province browning was light to moderate.

In Nova Scotia, birch trees were generally less severely attacked than in 1954. The most striking injury occurred in the Upper Stewiacke Valley and in the Upper Musquodoboit area where defoliation was 70 to 90 per cent. Severe browning also occurred in the Annapolis Valley between Kentville and Berwick, along the South Shore from Liverpool to Bridgewater, along the Rawdon Road, Hants County and near Parrsboro, Cumberland County.

In Prince Edward Island, infestations were not as severe as in 1954.

| | Reports | Collections |
|---|---|---|
| New Brunswick | 4 | 4 |
| Nova Scotia | 4 | 13 |
| Prince Edward Island | 1 | — |

***Fall Webworm,*** *Hyphantria textor* Harr.—No collections of this species were taken in New Brunswick or Prince Edward Island in 1955. In Nova Scotia, it was common on alder along roadsides, but infestations were generally light.

| | Reports | Collections |
|---|---|---|
| Nova Scotia | 3 | 18 |

***Birch Leaf Miner,*** *Fenusa pusilla* (Lep.).—Browning of gray birch foliage was light to moderate throughout New Brunswick except for some stands at Geary, Sunbury County, Petersville, Queens County and at Marysville, York County, where there was up to 90 per cent browning. In Nova Scotia, gray birch leaves were 70 per cent browned along the northeastern shore of Pictou and Antigonish counties. Other severe attacks occurred in the Wentworth Valley and near Paradise and Middleton, Annapolis County.

Only light infestations were reported in Prince Edward Island.

| | Reports | Collections |
|---|---|---|
| New Brunswick | 9 | 41 |
| Nova Scotia | 3 | 8 |
| Prince Edward Island | 2 | 3 |

***Birch Casebearer,*** *Coleophora salmani* Heinr.—Browning of white and gray birch foliage by this insect was generally light throughout the Maritime Provinces, but ranged from 50 to 80 per cent between Stanley and Covered Bridge in New Brunswick. The old outbreak of birch casebearer at Joggins in Nova Scotia has declined greatly and only scattered areas of light browning occurred.

| | Reports | Collections |
|---|---|---|
| New Brunswick | 6 | 34 |
| Nova Scotia | 3 | 26 |
| Prince Edward Island | 1 | 3 |

***Forest Tent Caterpillar,*** *Malacosoma disstria* Hbn.—No infestations of this insect were reported in New Brunswick in 1955.

Except for some defoliation on a few scattered aspen trees in the Maccan-Springhill-Oxford area, the infestations in Nova Scotia have virtually disappeared.

| | Reports | Collections |
|---|---|---|
| New Brunswick | 2 | 1 |
| Nova Scotia | 3 | 5 |

***Mountain-ash Sawfly,*** *Pristiphora geniculata* (Htg.).—The insect was common on both American and European mountain ash trees throughout the Maritime Provinces. Defoliation did not exceed 50 per cent except along the Upper St. John River Valley where the foliage on a few trees was almost completely destroyed.

| | Reports | Collections |
|---|---|---|
| New Brunswick | 3 | 41 |
| Nova Scotia | 3 | 42 |

***Leaf-Miners on Arborvitae,*** *Argyresthia thuiella* (Pack.), *A. freyella* Wlshm., *A. aureoargentella* (Brower), and *Recurvaria thujaella* (Kft.).—The analysis of permanent sample plot data and general collecting records showed that population levels of these leaf-miners were low in New Brunswick in 1955.

| | Reports | Collections |
|---|---|---|
| New Brunswick | 1 | 2 |

***Basswood Looper,*** *Erannis tiliaria* (Harr.).—Few, if any, large collections of the basswood looper were taken in the Maritime Provinces. In 1955, however, the insect caused up to 75 per cent defoliation of maple, hazel, birch, and apple trees over a small area near Glen Levit, Restigouche County, N.B. The looper was common on a variety of hardwood hosts in other areas of northern New Brunswick, including the Green River Watershed, but little defoliation was reported. Insectary records showed a larval disease was common.

| | Reports | Collections |
|---|---|---|
| New Brunswick | 3 | 13 |
| Nova Scotia | — | 1 |

## NEWFOUNDLAND

***Spruce Budworm,*** *Choristoneura fumiferana* (Clem.).—Two outbreaks occurred in the western part of the Province in 1955, one in St. George's District between Stephenville Crossing and Port Au Port, and the other in St. Barbe District extending along the coast line from Trout River to Hawkes Bay. These infestations are shown on an accompanying map. Elsewhere in the Province budworm population levels were low.

The infestation in St. George's District covered an area of about 150 square miles and on the basis of defoliation estimates was classed as light to moderate. At the epicenter of the outbreak, which was about 1 square mile in area, defoliation of new growth ranged from 60 to 75 per cent on balsam fir, and from 50 to 60 per cent on spruce. At the periphery, defoliation ranged from a trace to 25 per cent on both spruce and fir. In St. Barbe District, the outbreak was more severe and covered an area of about 500 square miles. Loss of new foliage ranged from 50 to 90 per cent on balsam fir and from 10 to 50 per cent on spruce.

Balsam fir is the predominant tree species in both areas. In St. George's District, the outbreak is in an area infested by the balsam woolly aphid. The stand is about 45 years old and is so severely attacked by "gout" that the trees are not capable of supporting large budworm populations. In St. Barbe District the age of balsam fir ranged from 70 to 100 years in the most severely infested area but the trees were badly stunted from exposure to wind and sea, being about 15 to 20 feet in height. Elsewhere in the outbreak, stand age ranged from 45 to 65 years.

Egg sampling was carried out at 43 points in Newfoundland. Egg counts were high in the northern portion of the St. Barbe outbreak; elsewhere only light to moderate attack is expected in 1956.

| Reports | Collections | Larvae per tree sample | |
|---|---|---|---|
| | | Av. | Dev. from 1954 |
| 8 | 112 | 11·4 | −2·5 |

***Balsam Woolly Aphid,*** *Adelges piceae* (Ratz.).—There was little change in the known distribution of this insect in western Newfoundland during the year. The northern boundary of the main infestation is about 6 miles north of Black Duck. There was some extension of the scattered infestations reported in 1954, and new infestations occurred at South Brook, Humber District, and along the north shore of the Humber Arm. (See accompanying map). The eastern outbreak on the Avalon Peninsula remained unchanged, but a new infestation was reported on the Burin Peninsula between Burin and Winterland.

"Gout" continued to be the more common form of injury. New areas of "stem attack" were observed, near Stephenville Crossing, Black Duck, South Brook, and Gillam's.

Data obtained on the severity of attack in nine 100-tree plots showed that injury to balsam fir was variable even in the main area of infestation. The most severe damage was recorded at Flat Bay Brook, St. Fintans and South Branch where 90 per cent of the trees examined were attacked but only 3 per cent were dead. At North Branch and at Harry's River, near Black Duck, only 5 per cent of the trees showed symptoms of light "gout" attack. The largest trees were generally the most severely infested.

Releases of introduced predators were made during the year, in co-operation with the Insect Systematics and Biological Control Unit as follows:

*Laricobius erichsonii* (Rosen.), 5,304; *Pullus impexus* (Muls.), 890, and *Neoleucopis obscura* (Hal.), 21. Examination of 4·3 square feet of severely infested balsam fir bark yielded 462 puparia of a native predator, *Leucopis americana* (Mall.). Twenty-one adult specimens of the introduced predator, *Pullus impexus* (Muls.), released in 1954, were recovered at distances up to 200 feet from the release point.

Control of the aphid by salvaging merchantable timber and burning slash and small trees was attempted by the Bowater's Pulp and Paper Company in a 12- to 15-acre spot infestation at 3-Mile Dam near Corner Brook. A similar salvage operation is being carried out at Wild Cove Point.

Collections and reports numbered 1 and 8 respectively.

***Eastern Hemlock Looper,*** *Lambdina fiscellaria fiscellaria* (Guen.).—Except for an area of about 2 square miles where the defoliation of new shoots of balsam fir was about 25 per cent, outbreaks that have occurred on the Northern Peninsula for the past 3 years subsided in 1955. There was an increase in the looper population in the Triton Brook and Mink Pond areas in Bonavista North District. Elsewhere in Newfoundland, population levels were low.

| Reports | Collections | Larvae per tree sample | |
|---|---|---|---|
| | | Av. | Dev. from 1954 |
| 6 | 101 | 3·4 | +2·6 |

***Balsam Fir Sawfly,*** *Neodiprion abietis* (Harr.).—The balsam fir sawfly outbreak reported in 1954 near Gallants in St. George's District continued in 1955. About 7 square miles were infested and the attack was largely confined to cut-over stands where reproduction was from 8 to 15 years old. The only mature trees attacked were those bordering the cut-over. No tree mortality was recorded that could be attributed solely to sawfly attack. A few balsam fir trees on unfavorable sites have died but the sawfly may have only hastened their death.

| Reports | Collections |
|---|---|
| 3 | 40 |

***Larch Sawfly,*** *Pristiphora erichsonii* (Htg.).—The severe outbreak of this insect which occurred over the past two years in central and eastern Newfoundland continued in 1955. Defoliation was variable, ranging from about 10 to 90 per cent but more than three-quarters of the trees examined were 75 to 90 per cent defoliated. Severe defoliation was recorded on the Northern Peninsula. In the Deer Lake and Bonne Bay region, about one-third of the trees lost up to 25 per cent of their foliage. Elsewhere in western Newfoundland, there was no noticeable defoliation.

| Reports | Collections | Larvae per tree sample | |
|---|---|---|---|
| | | Av. | Dev. from 1954 |
| 18 | 115 | 14·6 | +7·9 |

***Larch Casebearer,*** *Coleophora laricella* (Hbn.).—Browning of larch foliage by this species was again negligible in 1955. Population increases were noted in western Newfoundland and at Millertown, and slight browning of the foliage occurred along the Millertown tramway. Collections totalled 22.

A previously described sampling technique was used in 1955 at 18 sampling stations. The information obtained is summarized as follows:

| District | No. sampling stations | Av. no. cases per sample | Population changes in 1955 |
|---|---|---|---|
| Western Newfoundland | 5 | 1·86 | General increase |
| Central Newfoundland | 4 | 3·78 | General increase |
| Eastern Newfoundland | 5 | 1·60 | Little change |
| Northern Newfoundland | 4 | 1·01 | Slight decrease |

***European Spruce Sawfly,*** *Diprion hercyniae* (Htg.).—There was no appreciable change from 1954 in the population level of this insect. The largest collections, averaging 5·7 larvae per tree sample, were taken in St. Barbe District.

| Reports | Collections | Larvae per tree sample | |
|---|---|---|---|
| | | Av. | Dev. from 1954 |
| 2 | 40 | 1·8 | −0·6 |

***Yellow-headed Spruce Sawfly,*** *Pikonema alaskensis* (Roh.).—Larvae of this species were generally scarce in 1955. Light defoliation was observed at Terra Nova and Gambo.

| Reports | Collections |
|---|---|
| 3 | 74 |

***Black-headed Budworm,*** *Acleris variana* (Fern.).—This species remained at very low population levels.

| Reports | Collections | Larvae per tree sample | |
|---|---|---|---|
| | | Av. | Dev. from 1954 |
| 1 | 17 | 0·8 | +0·3 |

***Eastern Spruce Barkbeetle,*** *Dendroctonus piceaperda* Hopk.—Active barkbeetle attacks were observed this year on scattered, over-mature white spruce trees in the Serpentine, Goose Arm and Stephenville Crossing areas. White spruce trees, killed by this species, were common throughout most of western and northern Newfoundland.

| Reports | Collections |
|---|---|
| 2 | 1 |

***Spruce Budmoth,*** *Zeiraphera ratzeburgiana* Sax.—Collections of this species were made early in the season in St. George's District where new shoot loss ranged from 10 to 15 per cent. Injury was confined mainly to white spruce although some collections were from balsam fir.

| Reports | Collections |
|---|---|
| 3 | 35 |

***European Pine Shoot Moth,*** *Rhyacionia buoliana* (Schiff.).—This species was collected on young ornamental Scots pine trees at Corner Brook in 1955. This is the first record of the insect in western Newfoundland.

| Reports | Collections |
|---|---|
| 1 | 1 |

***Satin Moth,*** *Stilpnotia salicis* (L.).—Defoliation of ornamental poplars by this species occurred at Gander, Gambo, Bishop's Falls, and Deer Lake. Fairly large collections were made from aspen trees in the Rattling Brook area where severe defoliation occurred.

| Reports | Collections |
|---|---|
| 2 | 24 |

***Fall Webworm,*** *Hyphantria textor* Harr.—Population levels of this insect were very low. Only a few webs were observed, mostly around Stephenville Crossing.

| Reports | Collections |
|---|---|
| 1 | 4 |

***Mountain-ash Sawfly,*** *Pristiphora geniculata* (Htg.).—Population levels of this sawfly remained high throughout western Newfoundland. Complete defoliation of mountain ash occurred at several points. Collections were made at Hare Bay on the Northern Peninsula for the first time.

| Reports | Collections |
|---|---|
| 3 | 15 |

***Dusky Birch Sawfly,*** *Croesus latitarsus* Nort.—This insect caused almost complete defoliation of white birch saplings, alder, and cherry along the White River Road in the Upper Humber area, and along the Humber River Road about 5 miles from Corner Brook. Each outbreak covered less than an acre.

| Reports | Collections |
|---|---|
| 4 | 7 |

## LIST OF CO-OPERATORS

Adams, M. J.
Anderson, A. M.

Banks, A. V.
Basque, R.
Beattie, J. H.
Boyde, Stanley
Brinson, Eric
Broderick, Cyril
Brown, Stewart
Budgell, Earnest
Budgell, H. W.
Burlock, C. L.
Burpee, E. M.
Burton, Andrew
Butler, H. A.
Butt, Arthur

Caines, John
Calloway, Ralph
Campbell, M.
Card, Garland
Carroll, J. H.
Clarke, Pius
Cochrane, R. E.
Collier, C.
Cougle, S. M.
Crocker, John
Cross, Clyde
Cross, Herbert
Crowe, A. F.
Crowell, E.
Curran, S. J.
Cyr, J. H.
Cyr, R.

Daigle, O. W.
Dickie, G. S.
Dingle, W. L.
Duthie, A. B.
Dwyer, Gregory

Elliott, Clarence
Evans, Ralph

Farquhar, J. E.
Feltham, Samson
Ferguson, M. A.

Garrett, Walter
Gillam, E. J.
Gillis, M. C.
Grace, James
Granville, C. C.
Greening, Rex

Hache, P. J. D.
Hancock, Gideon
Hanscome, C.
Harnett, Willis
Harrington, N.
Harty, James
Hawboldt, L. S.
Head, David
Henry, N. J.
Holloway, Clayton
Horsburgh, R. L.

Jesso, Hugh
Jones, J. J.

Kennedy, R.
Kinney, W. J.
Kirby, Hugh

Landry, J. L.
Lane, A. E.
Lane, Roland
Langdon, E. H.
Levesque, A.
Lounder, H. D.

MacCuish, D. H.
MacDonald, F. J.
MacDonald, J.
MacGillivray, H. G.
MacKenzie, K.
MacKillop, J.
MacMillan, A.
Matthews, G. W.
McAloon, H. J.
McAuley, Angus
McCallum, R. G.
McDonald, Donald
McDougal, H. V.
McFarland, C. W. A.
McKay, Harold
McKay, J. S.
McKay, Patrick
McLaughlin, J.
Morehouse, W. E.
Morris, Clyde
Morris, Kevin
Morrissey, Thomas
Muise, Dennis
Murray, H. J. H.

Northcott, S.
Noseworthy, Vanmond

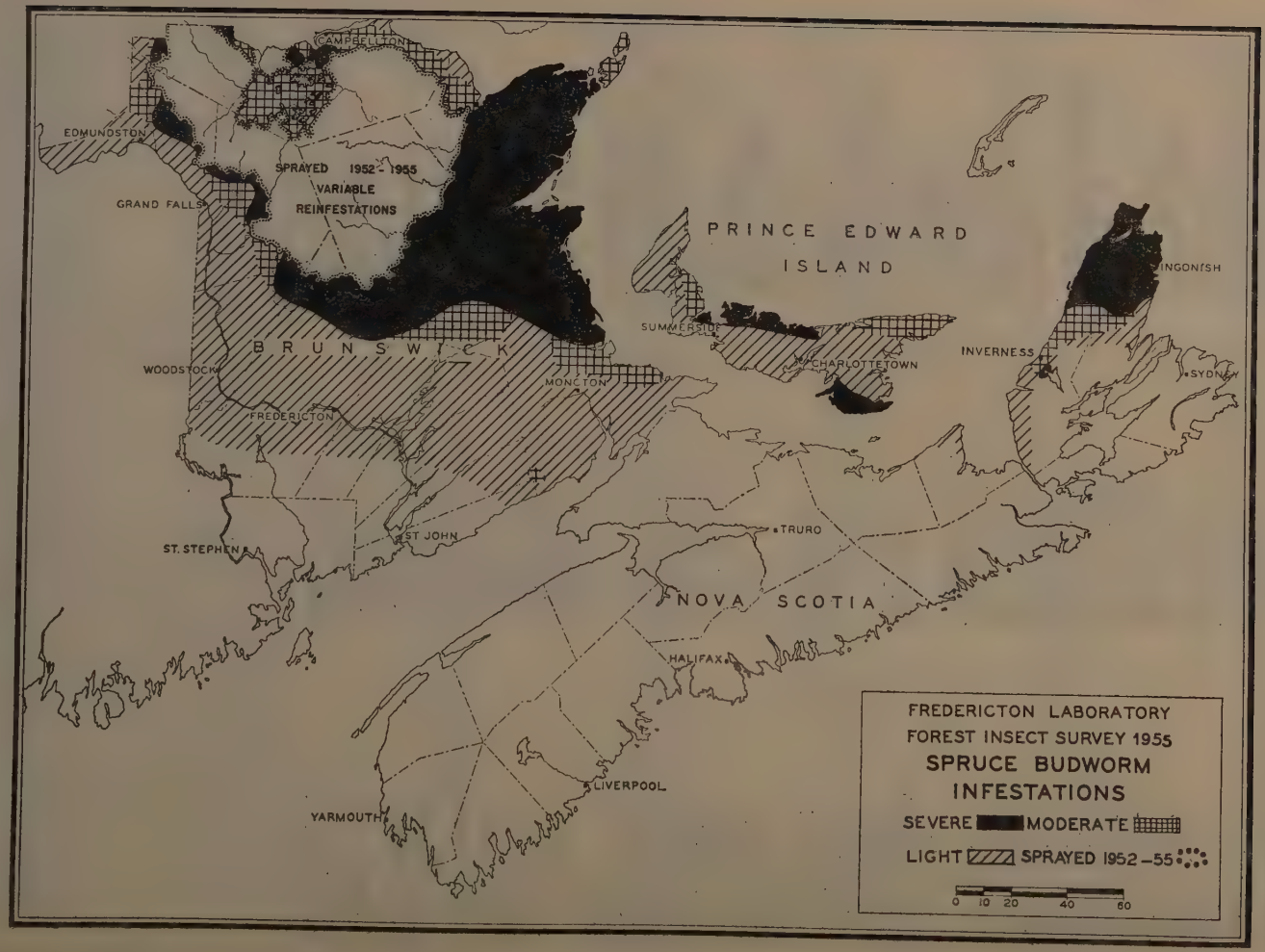
Palmer, L.
Pardy, W.
Parrott, Robert
Parsons, Ellis
Patterson, C. G.
Peddle, Thomas
Perrier, Edward
Porter, G. M.
Price, E.
Pritchett, Thomas
Pritchett, W.

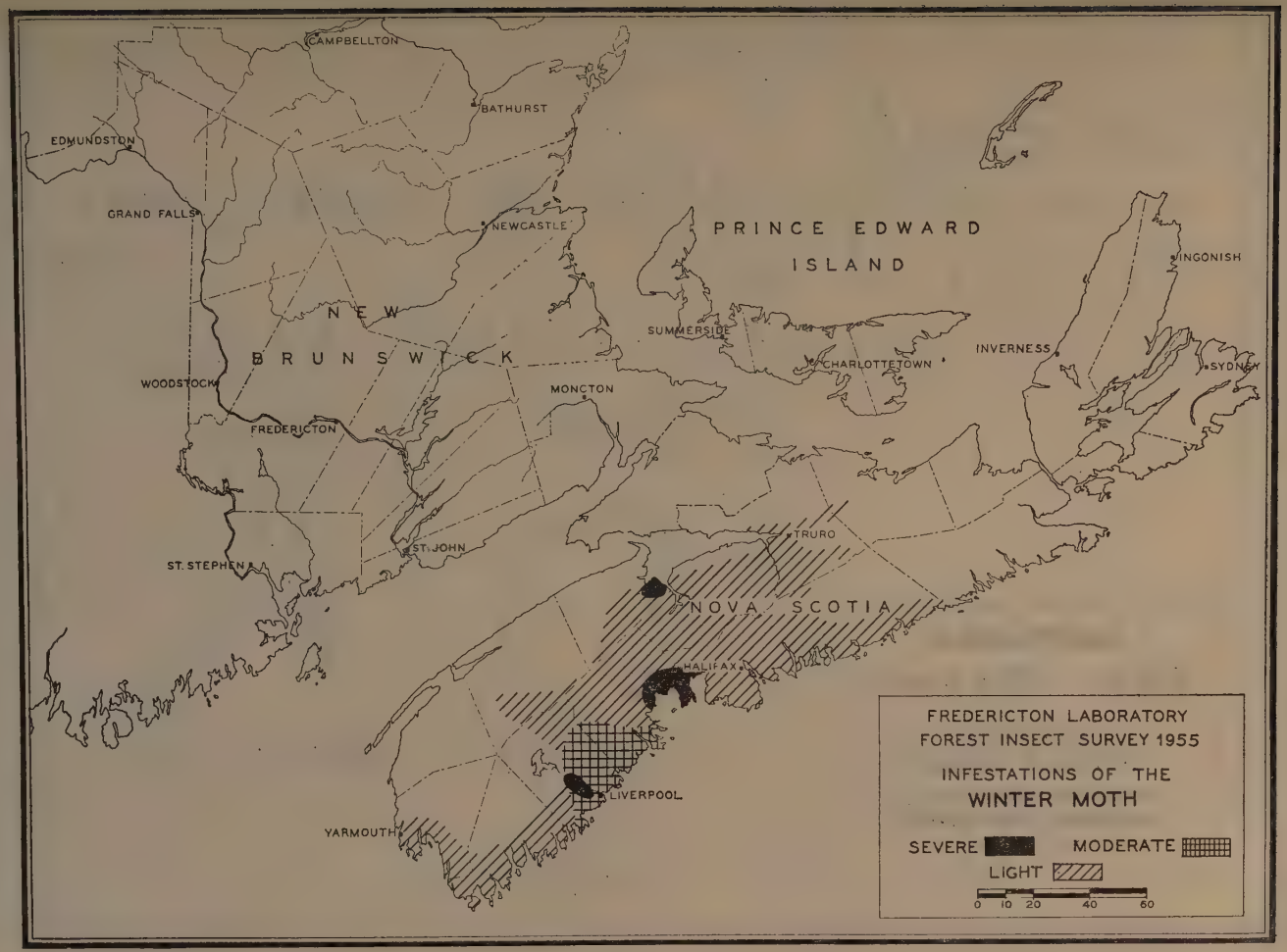
Refuse, G. D.
Richard, L. G.
Robinson, Douglas
Rose, Herbert
Rowe, W.

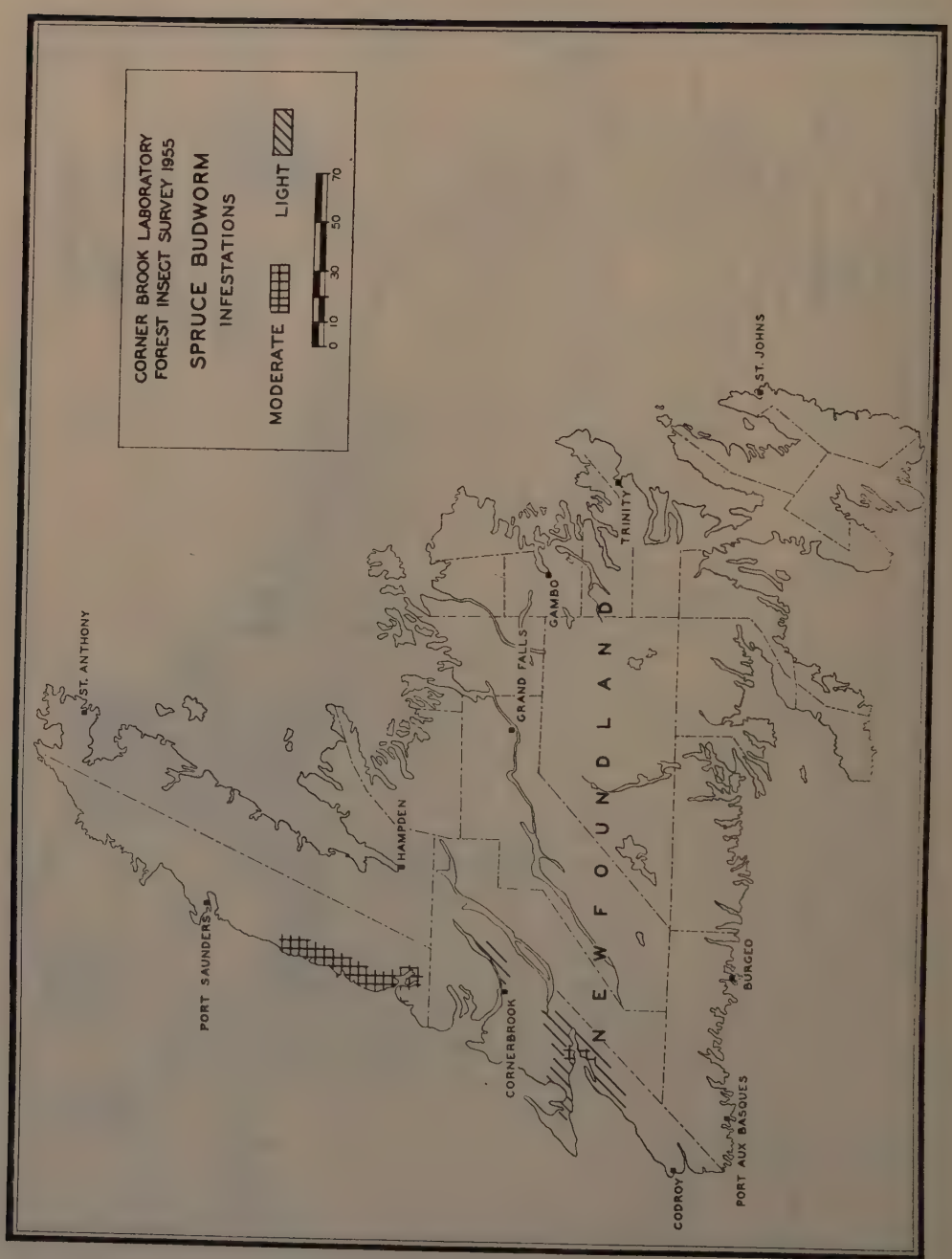
Shears, Dudley
Spencer, Herbert
Stead, Benjamin
Stuckless, Frank

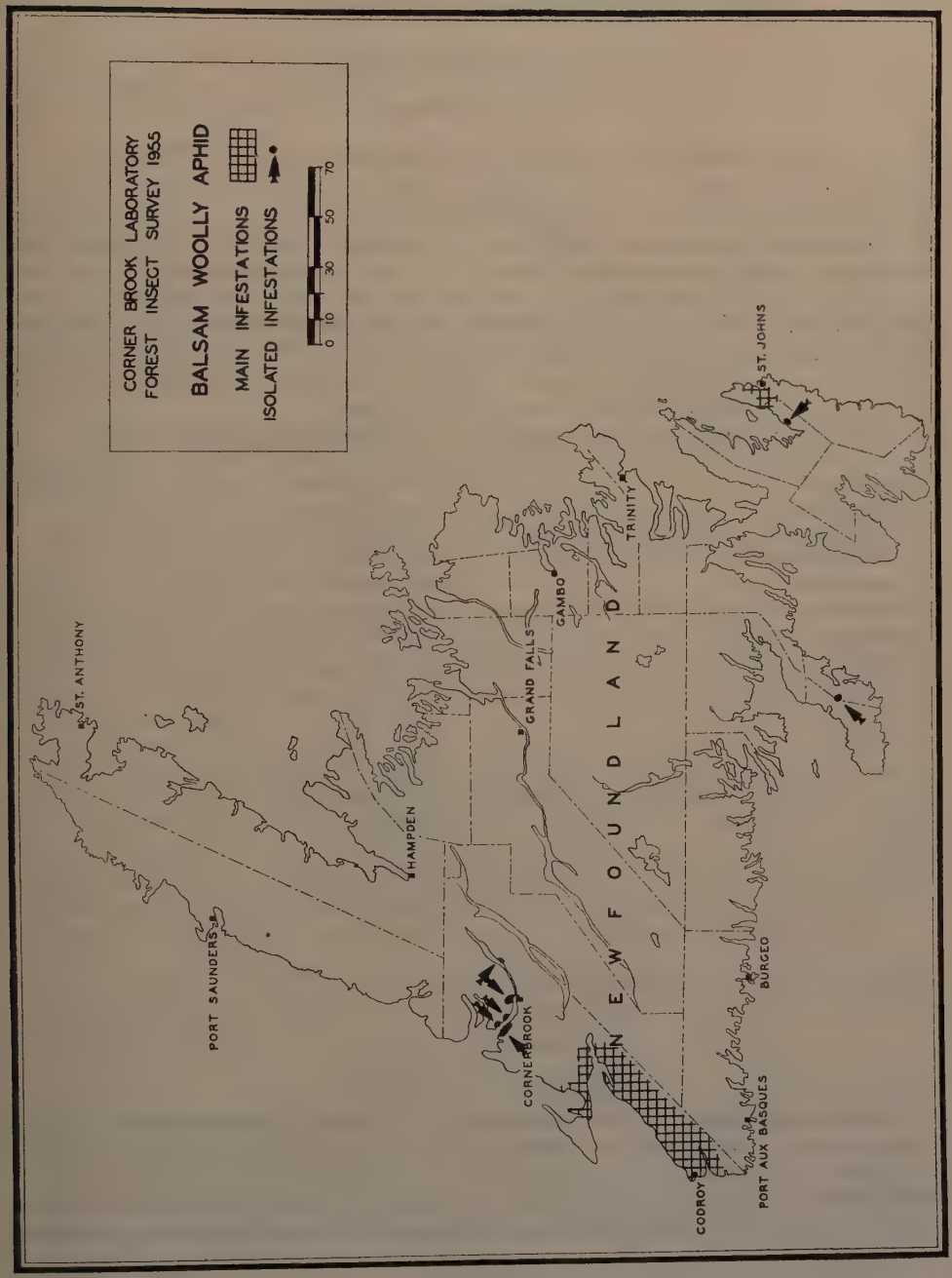
Theriault, R.
Tilley, B.
Tozer, B. S.

Webber, W. D.
Whalen, E. J.
Wheeler, W. A.
White, Ambrose
White, E.
White, Ronald
Williams, N. R.
Winters, J. W.


CAMPBELLTON
EDMUNDSTON
GRAND FALLS
SPRAYED 1952 - 1955
VARIABLE
REINFESTATIONS
PRINCE EDWARD
ISLAND
INGONISH
SUMMERSIDE
CHARLOTTETOWN
INVERNESS
SYDNEY
BRUNSWICK
WOODSTOCK
MONCTON
FREDERICTON
ST. JOHN
ST. STEPHEN
TRURO
NOVA SCOTIA
HALIFAX
LIVERPOOL
YARMOUTH
FREDERICTON LABORATORY
FOREST INSECT SURVEY 1955
SPRUCE BUDWORM
INFESTATIONS
SEVERE
MODERATE
LIGHT
SPRAYED 1952-55
0 10 20 40 60


CAMPBELLTON
BATHURST
EDMUNDSTON
GRAND FALLS
NEWCASTLE
PRINCE EDWARD
ISLAND
INGONISH
NEW
BRUNSWICK
SUMMERSIDE
CHARLOTTETOWN
INVERNESS
SYDNEY
WOODSTOCK
MONCTON
FREDERICTON
TRURO
ST. JOHN
ST. STEPHEN
NOVA SCOTIA
HALIFAX
LIVERPOOL
YARMOUTH
FREDERICTON LABORATORY
FOREST INSECT SURVEY 1955
INFESTATIONS OF THE
WINTER MOTH
SEVERE
MODERATE
LIGHT
0 10 20 40 60


CORNER BROOK LABORATORY
FOREST INSECT SURVEY 1955
SPRUCE BUDWORM
INFESTATIONS
MODERATE
LIGHT
0 10 30 50 70
NEWFOUNDLAND
ST. ANTHONY
PORT SAUNDERS
HAMPDEN
GRAND FALLS
GAMBO
TRINITY
ST. JOHNS
CORNERBROOK
BURGEO
PORT AUX BASQUES
CODROY


CORNER BROOK LABORATORY
FOREST INSECT SURVEY 1955
BALSAM WOOLLY APHID
MAIN INFESTATIONS
ISOLATED INFESTATIONS
0 10 30 50 70
NEWFOUNDLAND
ST. ANTHONY
PORT SAUNDERS
HAMPDEN
CORNER BROOK
GRAND FALLS
GAMBO
TRINITY
ST. JOHNS
BURGEO
PORT AUX BASQUES
CODROY

# ATLANTIC PROVINCES

## FOREST DISEASE SURVEY

A. G. Davidson

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### INTRODUCTION

The spring and summer of 1955 were drier and warmer than in the previous season and conditions were less favorable for the development of certain fungi. This, together with the fact that most of the staff were occupied with project work, was responsible for the smaller number of samples handled by the Forest Disease Survey in 1955. A total of 667 collections were received. Members of the Botany and Plant Pathology Division, Mycology Unit, Ottawa, kindly assisted with the identification of some of the fungi.

The distribution of the collections by tree hosts was as follows:

| Coniferous trees | Collections | Broad-leaved trees | Collections |
|---|---|---|---|
| Balsam fir | 102 | Trembling aspen | 70 |
| White pine | 19 | Cherry (misc.) | 58 |
| White spruce | 15 | Willows (misc.) | 48 |
| Red spruce | 9 | Red maple | 26 |
| Spruces (misc.) | 9 | Ashes (misc.) | 25 |
| Red pine | 7 | White birch | 20 |
| Larch | 6 | Red oak | 19 |
| Black spruce | 5 | Beech | 18 |
| Jack pine | 4 | Yellow birch | 16 |
| Others | 9 | Elms (misc.) | 15 |
| | | Largetooth aspen | 14 |
| Total | 185 | Horse chestnut | 13 |
| | | Maples (misc.) | 11 |
| | | Gray birch | 11 |
| | | Balsam poplar | 11 |
| | | Others | 35 |
| | | Total | 410 |

| | |
|---|---|
| Miscellaneous hosts | 72 |
| Grand Total | 667 |

### IMPORTANT DISEASES

***Elm Leaf Spots,***—*Phleospora ulmi* (Fr.) Wallr., the imperfect stage of *Mycosphaerella ulmi* Kleb., reported as causing severe defoliation in the town of Liverpool, N.S., in 1953 has continued to cause severe defoliation in that locality. A collection of this fungus was obtained from Brigus, Nfld. in 1954, on Camperdown elm but was not identified until after the 1954 report had been completed.

Attack by *Gnomonia ulmea* (Schw.) Thüm. was responsible for some defoliation of elms in St. Stephen, N. B. in 1955. This fungus was also collected in Charlottetown, P.E.I., and at Henderson's Cove and Fredericton, N.B., where the attack was not so severe.

***Red Flag of Balsam Fir.***—Dead branch tips on balsam fir were common in New Brunswick during 1955. Some of this flagging resulted from the branch canker, caused by *Valsa friesii* Duby, mentioned in the 1954 Report.

***Cherry Blight.***—The blight of pin cherry was again common and widespread throughout New Brunswick, Nova Scotia, and Prince Edward Island. The cause of this malady is still unknown.

***Ash Rust.***—Ash in southwestern Nova Scotia was again heavily attacked by *Puccinia sparganiodes* Ell. & Barth. Many dead and dying trees have been reported from this area. The fungus was found to occur in other parts of Nova Scotia, southern New Brunswick, and Prince Edward Island but infections were light.

***Oak Leaf Blister.***—Red oaks at various points in central and southern New Brunswick were heavily infected by the oak leaf-blister fungus, *Taphrina caerulescens* (Mont. & Desm.) Tul.

***Foliage Diseases of Balsam Fir.***—Rusts of balsam fir were not abundant during 1955. *Uredinopsis osmundae* Magn. was collected on *Osmunda claytoniana* L. at Fredericton, N.B.

Needle casts were common on balsam fir reproduction in New Brunswick, Nova Scotia, and Prince Edward Island. *Bifusella faullii* Darker was the most common cause of this disease.

A tip blight of balsam fir similar in appearance to that caused by *Rehmiellopsis balsameae* Waterman was collected from several points in New Brunswick. This disease attacks the needles of the current season's growth and a dieback of terminal or lateral shoots may result. *R. balsameae*, however, has not been found on the blighted needles.

***Salt Spray.***—It was noted that in much of the south shore area of Nova Scotia many white pine trees had a reddish-brown appearance. In many cases the complete foliage of large white pines was affected. Since this browning occurred along the sea coast and the heaviest damage appeared to be on the seaward side, it was attributed to salt spray blown inland by hurricane "Edna" in September, 1954. Trees similarly affected were reported from other coastal areas, especially in Gloucester Co., N.B., but the damage was less striking.

***Spruce Rust.***—Both *Chrysomyxa ledicola* (Peck) Lagerh. and *Chrysomyxa empetri* (Pers.) Schroet. were responsible for the spruce rust reported as being common on the Avalon Peninsula of Newfoundland in 1954.

***Inundation.***—The red maples which displayed an early reddening of the foliage due to flooding of the Saint John River and its tributaries during the summer of 1954, were alive in 1955.

***Tip Blight of Aspen.***—*Pollaccia radiosa* (Lib.) Bald. & Cif. was again widespread in New Brunswick, Nova Scotia, Prince Edward Island, and Newfoundland.

***Willow Blight.***—Collections of willow blight (*Fusicladium saliciperdum* (Allesch. & Tub.) Tub. and *Physalospora miyabeana* Fuk.) were received from New Brunswick and Prince Edward Island. Damage incurred by this disease appeared to be less severe than in 1954.

***Ink Spot of Aspen.***—Ink spot of aspen caused by *Ciborinia whetzelii* Seaver was common on trembling aspen near Balmoral, N.B., and was reported from other localities in northern New Brunswick.

## OTHER NOTEWORTHY DISEASES

| Host | Organism | Locality | Remarks |
|---|---|---|---|
| Alder | *Phyllactinia corylea* (Pers.) Karst. | Newcastle, N.B. | Causes a powdery mildew. |
| Cherry | *Dermea cerasi* (Pers. ex Fr.) Fr. | Penniac, N.B. | On dead tip of living tree. |
| Fir, balsam | *Bothrodiscus pinicola* Shear. | Ripples, N.B. | Associated with cankers. This is the imperfect state of *Ascocalyx abietis* Naum. |
| Fir, balsam | *Rhizothyrium abietis* Naum. | McGivney Jct., N.B., Wilton-Dale, Nfld. | On dead needles of living trees. J. A. Parmelee states that these are new North American records. |
| Pine, lodgepole | *Cronartium coleosporioides* (D. & H.) Arth. | Tatamagouche, N.S. | Causes a fusiform gall on stems. |
| Ironwood | *Cylindrosporium dearnessii* Ell. & Ev. | Upper Stewiacke, N.S., Coldstream, N.B., Weldon, N.B. | Causes a leaf spot. |

## LIST OF CO-OPERATORS

Allison, W. C.
Black, L. D.
Byers, A. F.
Clarkson, S. F.
Cougle, S.
Emerson, W. E.
Frizzell, K.
Hawboldt, L. S.
Howatt, J. L.
Hutchison, A. W.
James, L. H.
Kirkpatrick, R. G.
MacDonald, D. M.
MacGillivray, H. G.
Martin, A.
McFarland, C. W.
Miles, H. B.
Spencer, G. R.
Staples, K. H.
Williams, N. R.
Young, R. H.

# PROVINCE OF QUEBEC

## FOREST INSECT SURVEY

René Martineau and René Béique

*Forest Biology Laboratory, Forest Zoology Unit, Quebec, Que.*

### INTRODUCTION

Early in 1955, arrangements were made with the Quebec Bureau of Entomology for the conduct of forest insect surveys in Quebec. The Bureau of Entomology will continue its province-wide general survey and the Forest Biology Division will restrict its activities to major insect problems under detailed study by its Quebec Laboratory and to specific problems of particular interest. In 1955, the surveys conducted by the Forest Biology Division concerned the spruce budworm in the Gaspe and adjacent areas, jack-pine sawflies in the central part of the Province, the European spruce sawfly in certain areas, and the European pine shoot moth in and around Quebec City. The results of these restricted surveys are presented below and it should be appreciated that the maps presented with this Report do not necessarily represent conditions for the Province as a whole, but only for those areas studied. It is expected that results of surveys carried out by the Quebec Bureau of Entomology will be published elsewhere.

### IMPORTANT INSECTS

***Spruce Budworm,*** *Choristoneura fumiferana* (Clem.).—This insect is a serious problem in the Lower St. Lawrence and Gaspe regions, where large-scale aerial spraying operations were carried out in 1954 and again in 1955, in an attempt to lower the insect population level in the most seriously threatened balsam fir stands. In 1954, approximately 318,000 acres of coniferous forests were treated in the regions of Rimouski, Mistigougeche, Mitis and Patapedia. In 1955, the operations were much more extensive and covered 1,040,000 acres, 91,000 of which were in the Rimouski River Watershed, 173,000 in the Matane and Cap Chat watersheds and 776,000 in the Baie des Chaleurs District.

Additional to the above, a few centers of heavy infestation, limited in area, still persist in the Lake St. John Region and on the North Shore of the St. Lawrence River. In the old infestations in the St. Maurice and Jacques Cartier regions, balsam fir mortality continues and at an increasing rate. The salvage of this timber constitutes a serious problem to limit holders.

Early spring observations in the lower St. Lawrence and Gaspe areas indicated that larval population levels varied considerably from one area to another, being generally higher in the Rimouski and Matane regions, where between 25 and 50 larvae could be found per 18-inch balsam fir branch-tip, compared with only six in the Baie des Chaleurs District. This last figure was considerably lower than expected from the egg survey conducted in 1954. No definite explanation can be furnished for this decline, but it is suspected that it might be due to the exceptionally adverse weather conditions which prevailed

during the late summer and fall of 1954. However, during the spring and summer 1955, climatic conditions were very favorable to insect development, so that a high proportion of the larvae reached maturity. The defoliation of the current year's growth in the Lower St. Lawrence and Gaspe regions is shown on the accompanying map. Defoliation was light in all regions sprayed in 1954 and 1955, except for relatively small areas of moderate attack in the Baie des Chaleurs District.

Outside the sprayed areas, severe defoliation was general being particularly noticeable in the following locations: (1) North of the sprayed area on the Rimouski and Mitis watersheds; (2) In the Cap Chat River watershed; (3) On the Matapedia Seigniory and the lower section of Assemetquagan and Escuminac rivers watersheds; (4) On a stretch of land approximately 15 miles wide, in central Gaspe, extending from the head of Petite Matane River to the Bonaventure Burn; (5) In all forest areas located between Grande Riviere and St. John rivers watersheds. Defoliation was light, however, in the lower section of Petite and Grande Pabos rivers, where severe feeding had occurred in previous years. Defoliation was also light in Gaspe North County.

Results of the 1955 egg-mass survey indicate that egg deposition was generally light to moderate in all areas sprayed in 1954, and light in most areas sprayed in 1955. Exceptions were approximately 20 square miles in the Matane River watershed and 45 square miles in the Cascapedia River watershed where counts were unusually high. These high counts may be attributed to an invasion of moths from surrounding unsprayed areas.

In unsprayed areas, egg counts were high and barring unforeseen developments, severe defoliation may be expected in 1956.

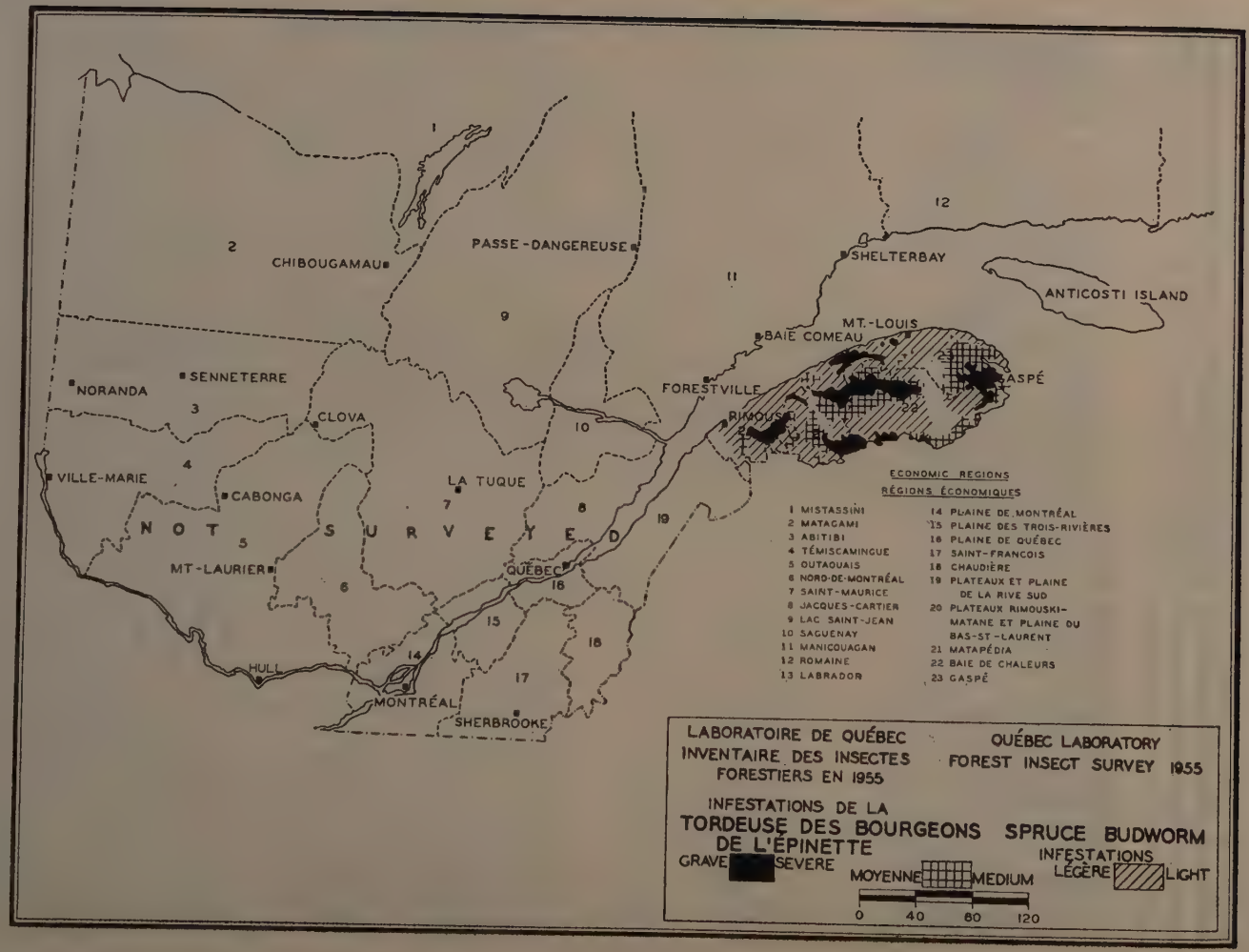
***Jack-pine Sawfly,*** *Neodiprion swainei* Midd.—The extensive collecting program for jack-pine sawflies initiated in 1954 in co-operation with the limit holders, was continued in 1955. The territory covered included the area south and west of the St. Maurice watershed. Collections were made of overwintering cocoons and mature larvae. Cocoon samples were made by counting the number found in two 1-square-foot samples of forest soil at each sampling point. Larval samples were obtained at approximately the same locations by beating the foliage over a standard sized sheet. All samples were sent to the temporary field station at Clova (Abitibi) for analysis and rearing. The collection program was supplemented by an aerial reconnaissance at the end of the feeding season. The intensity of sawfly infestations was recorded according to color variations of the crown canopy as seen from the air.

Larval and cocoon collections received in 1955 totalled 422 and contained only *N. swainei.* The data showed that the insect was present in approximately the same general region as in 1954. There was an apparent decrease in population level over the area as a whole, so that only small patches of heavy infestation remain as shown on the accompanying map. These heavily infested areas occurred at Lake Tourbis, Lake à la Carpe, Lake Gagnon, and in Landry and Buies townships and were surrounded by areas of medium infestation. Other patches of medium infestation were also located at Lake Barriere, and Lake des Isles on the Trenche River. The insect was also reported near Lake Bouchette, and on Rat River in the Lake St. John Region.

***European Spruce Sawfly,*** *Diprion hercyniae* (Htg.).—In 1954, there were indications of increased abundance of this insect in the Abitibi and St.

Maurice regions. To confirm these reports, a special reconnaissance trip was made early in 1955 through these regions and the Eastern Townships. The results indicated low population levels in all areas. Larvae were most numerous on young white spruce plantations near Lake Megantic. Most collections contained diseased larvae the proportion of which increased as the season advanced. Specimens were also received from Lake Dubois in the St. Maurice Region and from Temiscouata County.

***European Pine Shoot Moth,*** *Rhyacionia buoliana* (Schiff.).—The first collections of this insect were made near Quebec City in 1954. An intensive search was made in 1955 within a radius of 15 miles of Quebec City to determine the distribution and abundance of the insect. The infestation is apparently spreading eastward. All collections have been from mugho pine. No parasites were obtained from material reared in 1954, but in 1955, four species of hymenopterous parasites were obtained and accounted for approximately 12 per cent parasitism.


CHIBOUGAMAU
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FORESTVILLE
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NORANDA
SENNETERRE
CLOVA
VILLE-MARIE
CABONGA
LA TUQUE
MT-LAURIER
QUÉBEC
HULL
MONTRÉAL
SHERBROOKE
NOT SURVEYED
ECONOMIC REGIONS
RÉGIONS ÉCONOMIQUES
1 MISTASSINI
2 MATAGAMI
3 ABITIBI
4 TÉMISCAMINGUE
5 OUTAOUAIS
6 NORD-DE-MONTRÉAL
7 SAINT-MAURICE
8 JACQUES-CARTIER
9 LAC SAINT-JEAN
10 SAGUENAY
11 MANICOUAGAN
12 ROMAINE
13 LABRADOR
14 PLAINE DE MONTRÉAL
15 PLAINE DES TROIS-RIVIÈRES
16 PLAINE DE QUÉBEC
17 SAINT-FRANÇOIS
18 CHAUDIÈRE
19 PLATEAUX ET PLAINE DE LA RIVE SUD
20 PLATEAUX RIMOUSKI-MATANE ET PLAINE DU BAS-ST-LAURENT
21 MATAPÉDIA
22 BAIE DE CHALEURS
23 GASPÉ
LABORATOIRE DE QUÉBEC
INVENTAIRE DES INSECTES FORESTIERS EN 1955
QUÉBEC LABORATORY
FOREST INSECT SURVEY 1955
INFESTATIONS DE LA
TORDEUSE DES BOURGEONS DE L'ÉPINETTE
SPRUCE BUDWORM
GRAVE SEVERE
MOYENNE MEDIUM
INFESTATIONS LÉGÈRE LIGHT
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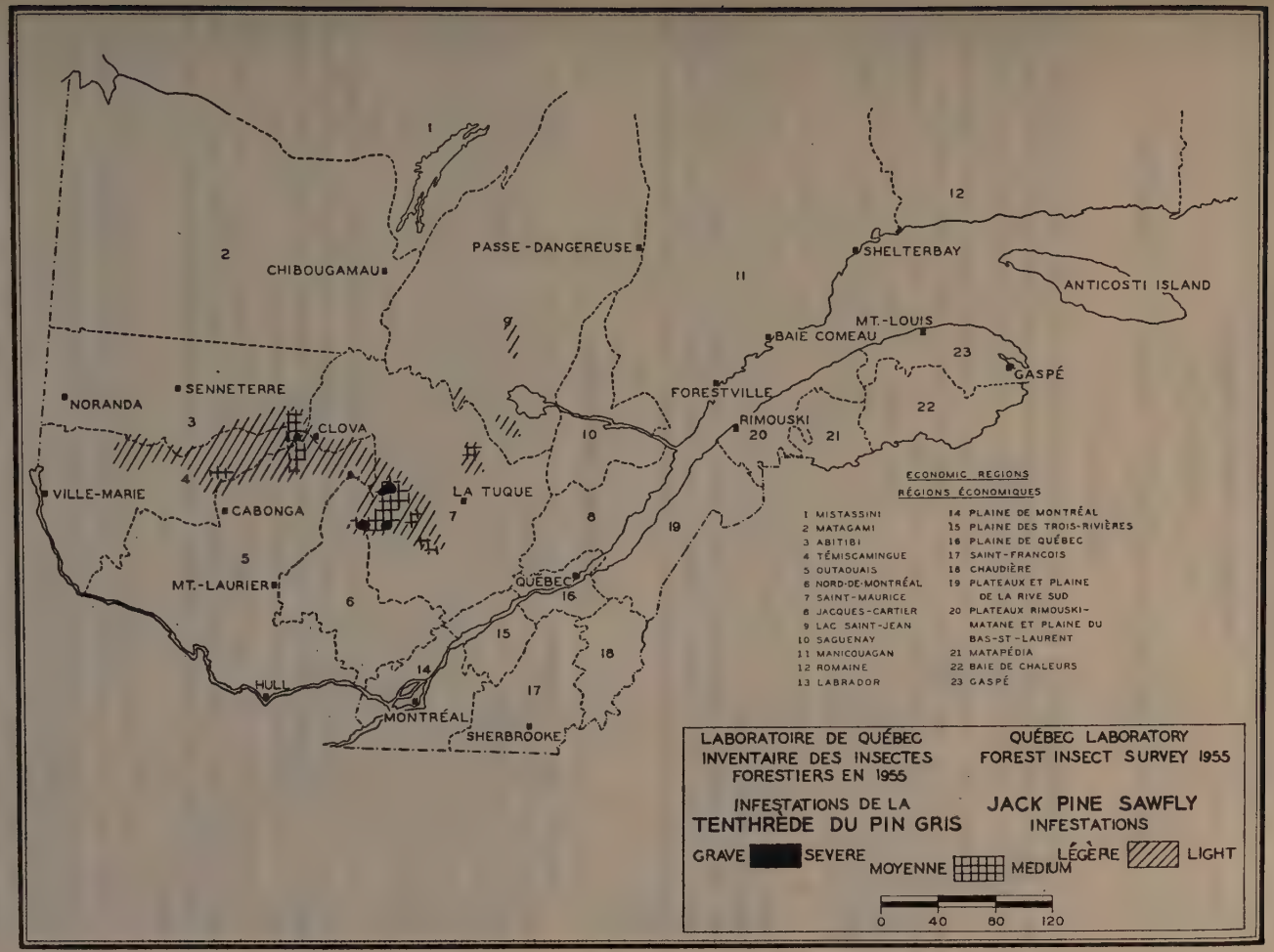
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NORANDA
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ECONOMIC REGIONS
RÉGIONS ÉCONOMIQUES
1 MISTASSINI
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12 ROMAINE
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14 PLAINE DE MONTRÉAL
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LABORATOIRE DE QUÉBEC
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INFESTATIONS DE LA
TENTHRÈDE DU PIN GRIS
JACK PINE SAWFLY
INFESTATIONS
GRAVE SEVERE
MOYENNE MEDIUM
LÉGÈRE LIGHT
0 40 80 120

# PROVINCE OF QUEBEC

## FOREST DISEASE SURVEY

RENÉ POMERLEAU

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### INTRODUCTION

The growing season of 1955 was particularly hot and dry in Quebec. In most areas of the Province, daily temperatures reached unusually high maxima and the amount of rainfall was abnormally low during June, July, and August.

During June and the first part of July, trees in most areas produced a vigorous growth and exhibited dark green foliage; possibly this was due to the previous growing season which was wet and cool. But from mid-July the situation appeared different at least in a few areas. In fact, the foliage of many hardwood trees began to shrivel and die. The gradual decline of a number of birch and spruce trees was studied in certain localized areas.

With the exception of collections made for specific investigations, only a small number of disease samples were sent to this Laboratory. Members of the staff, fully occupied with field projects, could not carry out regular surveys. For this reason, no important findings can be added to the data previously reported on the distribution of the red ring rot of conifers, the Hypoxylon canker of poplar, and the white trunk rot of hardwoods caused by *Fomes igniarius* (Fr.) Gill.

### IMPORTANT DISEASES

***Dutch Elm Disease.***—From observations in the area of infection, the epidemic is still increasing in intensity. The number of trees killed by this disease during the past 10 years is now so high that it is difficult to give even a broad evaluation of losses. Since the systematic scouting of infected trees was abandoned in 1949, the area of infection has slowly enlarged. This year a significant change can be reported with the finding of infections in Stanstead and Missisquoi counties, close to the United States border.

During 1955, a total of 501 records of this disease in Quebec were confirmed by the cultural method. Samples from 384 trees were cultured at the Botany and Plant Pathology Division in Ottawa and 117 samples at the Quebec Laboratory. Most were collected in the City of Sherbrooke.

The 1955 annual examination of six, 1-square-mile sample plots was the tenth check since their establishment in 1946. Results of this year's survey in the plots and in the 1-mile-radius buffer zones were added to records of previous years.

As noted in previous reports, the cumulative percentage of infected elms is rather low in the sample plots, in which the trees are scattered. However, in both plots and buffer zones, the number of new infected trees is greater in 1955 than during the last few years.

In most cities surveyed annually since 1945, records of mortality are no longer available. However, scouting in Sherbrooke has revealed a marked increase over the previous years, since the number of infected trees has increased from 249 in 1954 to 325 in 1955. In 1955, 47 diseased trees were found in

Montreal, where the highest number of infections reported in any year since 1945 was 28. These figures and general observations indicate an increasing rate of infection in Quebec.

| | Sample Plots | | Buffer Zones |
|---|---|---|---|
| | Total number of elms: 2,102 | | (1) |
| Year | Number of diseased trees | Cumulative percentage diseased | Number of diseased trees |
| 1946 | 13 | 0·61 | 40 |
| 1947 | 21 | 1·61 | 60 |
| 1948 | 17 | 2·42 | 60 |
| 1949 | 9 | 2·55 | 55 |
| 1950 | 19 | 3·75 | 61 |
| 1951 | 14 | 4·42 | 33 |
| 1952 | 6 | 4·71 | 20 |
| 1953 | 15 | 5·42 | 31 |
| 1954 | 14 | 6·08 | 48 |
| 1955 | 38 | 7·89 | 56 |
| Total | 166 | ..... | 468 |

(1) Only the number of new diseased trees is known in buffer zones.

***Dying of Hardwoods.***—During the early summer of 1955 birch trees and most other hardwood species were apparently in a healthier condition than in the past few years. However, toward the end of July an unhealthy condition developed in some areas after two months of dry hot weather. The sudden wilting of the foliage of birch, maple, beech and other hardwood trees was noted on certain sites where the soil is thin. Although a well-defined decline of hardwood trees was observed in a few small areas, no significant change was noted in the general condition of most white birch stands visited.

***Deterioration in White Spruce Plantations.***—A general improvement in the color of needles of white spruce was noted in the plantations of the Consolidated Paper Corporation near Grand'Mere. At Cap-de-la-Madeleine, a significant increase in the growth of white spruce was recorded in sample plots treated with chemical fertilizers (potassium, phosphorus and magnesium, separately and in combination) as compared with control plots. The treatments were designed to correct the deficiency of the individual nutrients on the plots. The condition of a number of trees in the plantations near Grand'Mere was closely followed during the summer. The foliage of some trees passed from a state of normal green through extreme chlorosis to eventual death. The less rapid deterioration of other trees ended with the rainy period in August. Along with other factors, it seems evident that unusually hot, dry periods of weather were partly responsible for this deterioration. Study of the root system of 30 trees, by excavation and root washing, indicated that trees with vertical roots extending to the water table, have better withstood adverse environmental conditions. It was also found that trees were in better health where the horizontal root system is extensive than when it is less developed.

***Decay in Balsam Fir and Red Spruce Stands.***—Investigations initiated many years ago on conifer decay in Quebec were resumed in 1954 and continued in 1955 in the southeastern part of the Province. This project was carried out during the last two field seasons in co-operation with the St. Lawrence Paper Corporation. In 1954, 871 balsam fir and 240 red spruce trees were analyzed in 10 sample plots. In 1955, data from 1355 trees from the same area were added to this first group. A number of fungi were isolated and identified from decayed wood of both species. The most common were *Stereum*

*sanguinolentum* Alb. & Schw. ex Fr. and *Corticium galactinum* (Fr.) Burt in both balsam fir and red spruce, and *Fomes pini* (Thore) Lloyd only in red spruce. Other less frequent species were the following: *Poria subacida* (Pk.) Sacc., *Odontia bicolor* (Alb. & Schw. ex Fr.) Bres., *Coniophora puteana* (Schum ex Fr.) Karst., *Polyporus balsameus* Pk., *Merulius himantioides* Fr., *Polyporus circinatus* Fr., *Polyporus schweinitzii* Fr., *Armillaria mellea* (Vahl ex Fr.) Quel., *Fomes pinicola* (Swartz) Cooke, and *Stereum chailletii* Pers.

### OTHER NOTEWORTHY DISEASES

***Spruce Needle Rust.***—In a 30-year-old spruce plantation near Grand'-Mere, *Chrysomyxa ledicola* (Pk.) Lagerh. caused heavy needle mortality in a moist area. On the 209 infected trees tallied an average of 49 per cent of the 1955 needles was attacked. Trees 5 inches in diameter and 22 feet in height, in openings among *Ledum* plants, were the most heavily infected. The percentage of foliage attacked varied from 39 to 84 per cent. One black spruce, among the infected white spruce, was not infected.

***Conifer Chlorosis.***—Striking yellowish color of some spruce-fir stands was a common sight in extensive areas of the North Shore and Anticosti Island. This chlorotic aspect was more obvious on lowlands around lakes and bogs. A few dead trees were found among those exhibiting chlorosis. This condition seemed to be associated with shallowness of rooting in usually damp areas.

***Witches' Broom of Balsam Fir.***—An abnormal incidence of balsam fir bearing witches' brooms, presumably caused by *Melampsorella cerastii* (Pers.) Schroet., was found in 1955 on Anticosti Island. Such brooming is rare on the mainland. This rust has attacked from 20 to 50 per cent of the balsam fir on the western part of the Island. Several large brooms may be present on the same tree. Until a more complete survey is made, the importance of this disease cannot be evaluated.

# PROVINCE OF ONTARIO

## FOREST INSECT SURVEY

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### INTRODUCTION

Although there were many changes in status of the more important forest insect species in Ontario in 1955, the threat to forested areas and plantations in the Province was generally no greater than in 1954. Extensive increases in the area of heavy spruce budworm infestations in northwestern Ontario occurred again in 1955. The pine root-collar weevil was found near Sault Ste Marie; a new locality record for this species in Ontario. Population levels of the *Neodiprion* sawflies, excepting the red-pine sawfly, were markedly lower in northern Ontario in 1955 compared with 1954. The red-pine sawfly, however, continued to become more abundant. Larch sawfly infestations increased in the northeast. The known distribution of the European pine sawfly showed significant extensions in southern Ontario. The extent and severity of the European pine shoot moth infestations was unchanged. The forest tent caterpillar outbreak, which has been waning since 1952 showed further decline, affecting only a comparatively small area of northeastern Ontario in 1955.

Considerable progress was made in 1955 in clarifying life histories and the identification of immature stages of certain groups of insects. Biological studies of the aspen blotch miner were completed and publications will be forthcoming. Attention has now been focused on a complex of tortricid species which commonly attack young Scots pines in plantations. Studies on the forest tent caterpillar, European pine shoot moth and the *Neodiprion* sawflies were continued.

A total of 6,107 collections was received during the field season in 1955. Forest biology rangers submitted 5,016 collections independently and 388 jointly with co-operators. Ontario Department of Lands and Forests personnel made 499 collections. Forest Biology Division personnel exclusive of rangers, miscellaneous co-operators and employees of woods-operating companies contributed 102, 74, and 28 collections respectively. In 41 of the 6,107 collections received the host tree was not named or no host tree was involved; the remaining 6,066 were collected from some 75 tree species or species groups. The distribution of these collections among the principal tree species was as follows:

| Coniferous trees | Collections | | Broad-leaved trees | Collections | |
|---|---|---|---|---|---|
| Pine— | | | Poplar— | | |
| Jack pine | 1,101 | | Trembling aspen | 440 | |
| Red pine | 316 | | Balsam poplar | 74 | |
| Scots pine | 250 | | Large-tooth aspen | 8 | |
| White pine | 111 | | Miscellaneous poplars | 4 | |
| Miscellaneous pines | 23 | | | | 526 |
| | | 1,801 | | | |
| Larch | | 727 | Birch— | | |
| | | | White birch | 365 | |
| Spruce— | | | Yellow birch | 15 | |
| White spruce | 477 | | Miscellaneous birches | 27 | |
| Black spruce | 143 | | | | 407 |
| Miscellaneous spruces | 72 | | | | |
| | | 692 | Cherry | | 269 |



68546—3½

| Coniferous trees | Collections | | Broad-leaved trees | Collections | |
|---|---|---|---|---|---|
| Balsam fir | | 409 | Alder | | 209 |
| Cedar— | | | Willow | | 167 |
| Eastern white cedar | 67 | | Maple— | | |
| Northern red cedar | 1 | | Red maple | 99 | |
| | | 68 | Sugar maple | 29 | |
| Hemlock | | 14 | Miscellaneous maples | 38 | |
| Other coniferous trees | | 15 | | | 166 |
| Total | | 3,726 | Elm | | 163 |
| Miscellaneous hosts or hosts unspecified | | 97 | Oak— | | |
| | | | Red oak | 68 | |
| | | | White oak | 44 | |
| | | | Miscellaneous oaks | 11 | |
| | | | | | 123 |
| | | | Walnut, butternut, hickory | | 67 |
| | | | Ash | | 29 |
| | | | Basswood | | 29 |
| | | | Miscellaneous broad-leaved trees | | 129 |
| | | | Total | | 2,284 |

Grand Total..... 6,107

Only 78 collections did not contain insects or other arthropods upon examination at the laboratory. The other 6,029 collections yielded 7,218 species samples distributed as follows:

| Order | Samples |
|---|---|
| Lepidoptera | 3,016 |
| Hymenoptera | 2,780 |
| Coleoptera | 779 |
| Homoptera | 361 |
| Diptera | 117 |
| Hemiptera | 43 |
| Acarina | 26 |
| Orthoptera | 11 |
| Neuroptera | 3 |
| Corrodentia | 1 |
| Trichoptera | 1 |
| Total | 7,218 |

Of these samples 5,542, or 77 per cent, were identified to species on receipt. Many of the remainder can be identified further when the rearing program is completed.

## IMPORTANT INSECTS

***Spruce Budworm,*** *Choristoneura fumiferana* (Clem.).—Substantial increases in the overall extent of spruce budworm infestations have been recorded in Ontario for five consecutive years. Except for very minor increases in areas of infestation in the Northern Region, these extensions have been confined to the Western and Midwestern regions. In 1955, the most marked change was the general upsurge of spruce budworm populations in the southern part of the Western Region. The accompaning map shows the areas of medium-to-heavy infestation and the extent of host tree mortality in the Western Region observed in 1955.

In 1955, the outbreak in the Western Region extended from Trout and Birch lakes in the northern part of the Sioux Lookout District southeast around Sturgeon Lake and thence south to Rainy Lake on the Ontario-Minnesota

boundary. In the west the infestation extended over the Ontario-Manitoba boundary in two broad bands west of Lake of the Woods and at the Winnipeg River. Four major boundary changes were involved as follows: northeast from Trout Lake to Birch Lake, east along Sturgeon Lake, south through the Fort Frances District and west of Lake of the Woods. Although heavy infestation occurred in a large part of the Fort Frances District, balsam fir and white spruce trees are only minor components of the forest stands in much of the area concerned. Population levels were maintained where medium-to-heavy infestation was observed in 1954.

In the northwestern corner of the Sioux Lookout District, outside the main area of infestation, the three small pockets of medium-to-heavy infestation first mapped in 1952 around Musclow, Sabourin, and Laurus lakes merged in 1955. Southward high population levels were recorded at Carroll Lake for the fourth consecutive year and a new small infestation was observed east of Wingiskus Lake.

The six small infestations reported south of Lake St. Joseph in 1954 enlarged in 1955, and the three westerly ones coalesced to form a single infestation. High population levels persisted on islands in Attwood Lake.

In the Midwestern Region the heavy infestations in the southwestern corner of the Geraldton District and on the Black Bay Peninsula in the Port Arthur District merged in 1955. The Geraldton portion of the infestation extended about 10 miles east of the 1954 boundary. Heavy infestation persisted on the Sibley Peninsula, Port Arthur District, whereas in the Disraeli-Little Sturge lakes area the infestation declined in extent and intensity in 1955.

The medium-to-heavy infestations in Rogers and Studholme townships, Kapuskasing District, and in Sydere Township south of Smooth Rock Falls on the Cochrane-Kapuskasing district border declined to light intensity in 1955. Elsewhere in the Northern Region a new infestation was mapped in Boyce Township and in parts of Clavet and Bicknell townships in the northwestern corner of the Kapuskasing District.

A light infestation persisted on white spruce trees in Parkinson Township, Sault Ste. Marie District. The light infestation south of Pembroke in the Pembroke District declined to a very low level in 1955. Heavy defoliation of the current year's foliage of white spruce trees in the Uxbridge Forest in the Lake Simcoe District occurred for the third consecutive year. An unusually high proportion of the larvae in this infestation were found to be infected by a microsporidian, *Perezia fumiferanae* Thom., and it was possibly of importance as a control factor.

As early as 1949 moderate-to-heavy mortality of spruce and balsam fir trees had been reported from the south-central part of the Sioux Lookout District. Since that time the areas within which host trees have been so affected have increased yearly. In 1955 the area of heavy mortality comprised a triangular area roughly delineated by Little Vermilion Lake and Williams Bay of Lac Seul in the Sioux Lookout District and Sandy Lake in the Kenora District. The principal salient from this area extended approximately 20 miles eastward along the Wenasaga and Papaonga rivers in the Sioux Lookout District. Host trees in an area of about 100 square miles surrounding Woman Lake suffered heavy mortality. Little change has been reported in the extent of host tree mortality between Lac Seul and Minitaki Lake in the Sioux Lookout District.

| | | | |
|---|---|---|---|
| Chapleau | 3 | Port Arthur | 30 |
| Cochrane | 5 | Rideau | 2 |
| Fort Frances | 44 | Sault Ste. Marie | 6 |
| Geraldton | 46 | Sioux Lookout | 63 |
| Kapuskasing | 10 | Sudbury | 2 |
| Kenora | 68 | Swastika | 2 |
| Lindsay | 2 | Tweed | 2 |
| Pembroke | 2 | White River | 4 |

***Larch Sawfly,*** *Pristiphora erichsonii* (Htg.).—Trends in the distribution and intensity of larch sawfly infestations in Ontario in 1955 generally followed those evident in recent years. Population levels decreased in the northwestern portion of the Province, whereas with one exception increases in intensity and number of infestations occurred throughout the central and southeastern parts of the Province. The general occurrence of light, medium, and heavy larch sawfly infestation in Ontario in 1955 is shown on the accompanying map.

The center of heavy infestations of the larch sawfly shifted eastward in 1955 to include most of northern and central Ontario from the Geraldton and White River districts to the Quebec boundary. Further declines in the light infestations which occurred in the Kenora District and in the southern part of the Sioux Lookout District in 1954 were apparent in 1955. Less conspicuous yet important declines were observed in the Fort Frances and Port Arthur districts. In the Sault Ste. Marie, Sudbury, and North Bay districts occasional heavy infestations were detected. In the first two, defoliation was much less severe than was expected from egg densities.

Colonies of this sawfly were found commonly in Parry Sound and Pembroke districts in 1955 and throughout southern Ontario collections were received from widely separated localities.

For the first time in about 10 years no heavy infestations were detected in the Sioux Lookout and Kenora districts. In spite of the persistence of severe attack, larch stands have suffered little tree mortality.

| | | | |
|---|---|---|---|
| Chapleau | 45 | Parry Sound | 38 |
| Cochrane | 54 | Pembroke | 36 |
| Fort Frances | 30 | Port Arthur | 44 |
| Geraldton | 62 | Rideau | 5 |
| Gogama | 24 | Sault Ste. Marie | 23 |
| Kapuskasing | 42 | Sioux Lookout | 10 |
| Kenora | 43 | Sudbury | 25 |
| Lake Erie | 2 | Swastika | 56 |
| Lindsay | 3 | Tweed | 9 |
| North Bay | 33 | White River | 55 |

***European Pine Shoot Moth,*** *Rhyacionia buoliana* (Schiff.).—There was no major change in the distribution of this introduced insect pest in southern Ontario in 1955. Throughout the affected area, which lies west of a line joining the tip of the Bruce Peninsula, Lake Huron District, through Lake Simcoe to Kingston in the Tweed District, infestations were generally as heavy in 1955 as in 1954.

Estimates of the over-wintering mortality of young larvae made at a number of localities in 1955 showed considerable variability as in 1954. An extensive rearing program carried out in 1954 and 1955 indicated that insect parasites did not exert any appreciable controlling influence on this pest.

| | | | |
|---|---|---|---|
| Lake Erie | 18 | Lindsay | 18 |
| Lake Huron | 17 | Rideau | 4 |
| Lake Simcoe | 23 | Tweed | 6 |

***Pine Root-Collar Weevil,*** *Hylobius radicis* Buch.—Practically no change occurred in 1955 in the status of the pine root-collar weevil infestations in Simcoe County, Lake Simcoe District. No new infestations were discovered, and increased mortality of injured Scots pine in some areas was the only development worthy of mention.

In August, 1955, a heavy infestation of the pine root-collar weevil was discovered in a small planting of Scots pine at Pointe aux Pins, Parke Township, near Sault Ste. Marie. Very little host tree mortality has been caused by the attack.

The pales weevil, *Hylobius pales* Hbst., and another weevil, *Pissodes approximatus* Hopk., often attack trees dying from pine root-collar weevil injury. The pales weevil also invades stumps left after cutting operations.

| | | | |
|---|---|---|---|
| Lake Simcoe | 5 | Sault Ste. Marie | 2 |

***Forest Tent Caterpillar,*** *Malacosoma disstria* Hbn.—The continued decline of the forest tent caterpillar outbreak in Ontario is shown by the reduction in the area of medium-to-heavy infestation from 18,000 square miles in 1954 to 3,600 in 1955. Medium-to-heavy infestations persisted in parts of only two forest districts in 1955 and even in these areas population levels declined from those recorded in 1954. Infestations south of Temagami in the North Bay District declined to light intensity or disappeared, whereas from Latchford north into the south and central parts of the Swastika District trembling aspen suffered medium-to-heavy defoliation. A light infestation occurring in the northern and western parts of the Swastika District extended into the southeast sections of Cochrane and Gogama districts. Scattered remnants of the outbreak occurred elsewhere at widely-separated points in the Province, namely: a light infestation in a small area south of Lake St. Joseph, Sioux Lookout District; a medium infestation in one area west of Sudbury and in a small area in the Larose Forest, Rideau District; a sizeable area of light infestation in the northwestern part of the Chapleau District; and two small areas of light infestation just north of Lake Abitibi in the Cochrane District. Boundaries of medium-to-heavy infestation are delineated on the accompanying map.

Forecasts of infestation intensities made in 1954 were largely borne out by the defoliation pattern which developed in 1955. Several medium and one heavy infestation forecast for the Cochrane District did not materialize because many of the eggs failed to hatch.

Further declines in population levels are expected in 1956 throughout most of the areas of infestation mapped in 1955. This forecast is based on egg-band surveys which indicate that medium-to-heavy defoliation of trembling aspen will occur only in limited areas in the northern part of the North Bay District and in the Virginiatown area of the Swastika District. The accuracy of these predictions is dependent on the successful development of the larvae in 1956.

| | | | |
|---|---|---|---|
| Chapleau | 9 | North Bay | 26 |
| Cochrane | 24 | Rideau | 3 |
| Fort Frances | 3 | Sault Ste. Marie | 1 |
| Geraldton | 3 | Sioux Lookout | 3 |
| Gogama | 18 | Sudbury | 14 |
| Kapuskasing | 2 | Swastika | 53 |
| Lake Huron | 9 | Tweed | 2 |
| Lake Simcoe | 2 | White River | 5 |

***European Pine Sawfly,*** *Neodiprion sertifer* (Geoff.).—Significant extensions in the distribution of this introduced sawfly occurred in 1955. Most noteworthy of these were in Norfolk County, Lake Erie District, and in Dufferin County, Lake Simcoe District. This marks the first extensive recovery of this sawfly in the Lake Simcoe District; a single collection of larvae was made in 1953. The most easterly locality record of this species in Ontario is Bowmanville in the Lindsay District where officers of the Plant Protection Division found five larvae feeding on Scots pine in a nursery in June, 1953. The accompanying map shows the extension in the known range of this sawfly since 1950.

In 1955, a number of heavy infestations were reported in Scots pine plantations within the known distribution of the European pine sawfly; the more important being in Delaware and McGillivray townships, Lake Erie District; and near the towns of Paisley and Bayfield, Lake Huron District.

| | | | |
|---|---|---|---|
| Lake Erie | 24 | Lake Simcoe | 3 |
| Lake Huron | 41 | | |

***Red-headed Pine Sawfly,*** *Neodiprion lecontei* (Fitch).—Whereas heavy infestations of this sawfly were observed on red and Scots pines in numerous areas in southern Ontario, important recessions were reported in the southern parts of the Sault Ste. Marie, Sudbury, and North Bay districts in northern Ontario in 1955. The only heavy infestations observed in these three districts occurred in the Burwash Farm plantation, Sudbury District, and on a small number of trees in the Kirkwood Management Unit, Sault Ste. Marie District.

Although some population declines were evident in Lake Huron and Lake Simcoe districts, three heavy infestations were reported: near Dornock in Sullivan Township, Lake Huron District, where considerable mortality of red pine trees has occurred; in a 30-acre red pine plantation at Sparrow Lake north of Lake Simcoe, and in a 2-acre plantation of western yellow pine at the Midhurst Nursery in the Lake Simcoe District. A general decrease in abundance was also reported in the Parry Sound District. The only notable infestations occurred in Hagerman, Morrison, and Muskoka townships where heavy defoliation of red pine plantings occurred for the second year.

Generally there was little change in the number and intensity of red-headed pine sawfly infestations in the Lindsay and Tweed districts. In the Rideau District, however, heavy infestations were recorded more frequently in 1955 than in 1954. In the Lindsay District pockets of heavy infestation were reported at numerous points in Minden and Cardiff townships, Haliburton County. Infestations of varying intensity occurred at one place in the Tweed District and at three localities in the Rideau District as follows: a heavy infestation in a 10-acre red pine plantation near Coe Hill south of Bancroft; a heavy infestation on red, jack, and Scots pines in the Lanark County Forest near Hopetown; a medium-to-heavy infestation on red pine in the Leeds County Forest, Oxford and Walford townships.

The red-headed pine sawfly has been observed in the Kirkwood Management Unit, Sault Ste. Marie District, for several years and in both 1953 and 1954 there were alarming increases in larval population levels. In 1954, a few trees died as a result of sawfly attack and it was evident that, if populations continued to increase in 1955, heavy damage to red pine plantations in the Unit would likely result. An aerial spray program was organized during the winter of 1954-55 by the Ontario Department of Lands and Forests in consultation with officers of the Forest Biology Division. In 1955, however, a combination of natural control factors obviated the necessity for chemical control action. The more important controls were the unusually hot, dry weather during the summer of 1955 and egg parasitism which, although extremely variable, reached a high level in some areas as indicated in the accompanying table.

PARASITISM OF RED-HEADED PINE SAWFLY EGGS IN THE KIRKWOOD MANAGEMENT UNIT, SAULT STE. MARIE DISTRICT, AS DETERMINED BY DISSECTION.

| Location | Number of trees Sampled | Average per cent parasitism | Range per cent parasitism |
|---|---|---|---|
| Shedden Farm | 20 | 9·5 | 0–58·6 |
| McGill Creek | 20 | 42·9 | 0–94·7 |
| Lot 2, Con. V. Kirkwood Tp. | 20 | 38·6 | 0–87·4 |

A small number of the egg parasities were recovered and were identified as *Eupelmella vesicularis* (Retz.) and an entedontine species, possibly *Achrysocharis* sp.

| | | | |
|---|---|---|---|
| Lake Huron | 24 | Pembroke | 8 |
| Lake Simcoe | 8 | Rideau | 24 |
| Lindsay | 12 | Sault Ste. Marie | 26 |
| North Bay | 13 | Sudbury | 4 |
| Parry Sound | 25 | Tweed | 11 |

***Introduced Pine Sawfly,*** *Diprion similis* (Htg.).—Each year since 1949 localized infestations of this sawfly have occurred in the Lake Huron and Lake Simcoe districts. In 1955, populations of the insect were at such a low level that no larvae were observed.

***Yellow-headed Spruce Sawfly,*** *Pikonema alaskensis* (Roh.).—Larvae of this sawfly were not found as commonly in northern Ontario in 1955 as in previous years. In southern Ontario a similar condition prevailed in Lake Huron and Lake Simcoe districts. In the Southeastern Region, however, open-grown spruce trees in numerous localities were severely defoliated.

| | | | |
|---|---|---|---|
| Chapleau | 2 | Parry Sound | 10 |
| Cochrane | 17 | Pembroke | 23 |
| Fort Frances | 13 | Port Arthur | 6 |
| Geraldton | 13 | Rideau | 16 |
| Gogama | 3 | Sault Ste. Marie | 3 |
| Kapuskasing | 11 | Sioux Lookout | 2 |
| Kenora | 6 | Sudbury | 7 |
| Lake Huron | 7 | Swastika | 15 |
| Lake Simcoe | 5 | Tweed | 13 |
| Lindsay | 15 | White River | 21 |
| North Bay | 18 | | |

***European Spruce Sawfly,*** *Diprion hercyniae* (Htg.).—No change in distribution of this sawfly was detected in Ontario in 1955. Population densities either remained at the same level or declined compared with 1954.

| | | | |
|---|---|---|---|
| Cochrane | 1 | Parry Sound | 35 |
| Fort Frances | 14 | Pembroke | 12 |
| Lake Erie | 1 | Rideau | 6 |
| Lake Huron | 1 | Sault Ste. Marie | 5 |
| Lake Simcoe | 4 | Swastika | 9 |
| Lindsay | 13 | Tweed | 10 |
| North Bay | 10 | | |

***Balsam-fir Sawfly,*** *Neodiprion abietis* (Harr.).—Population trends of this insect differed greatly throughout the Province. Infestation intensities in the southern part of the Sault Ste. Marie District and at several points in the Lake Simcoe District declined sharply in 1955. Less marked reductions occurred in the North Bay, Parry Sound and Pembroke districts.

Severe defoliation of open-grown balsam trees occurred at numerous points in the Southeastern Region and in the Lake Huron District. In White River, Geraldton, Port Arthur, and Fort Frances districts colonies of larvae were observed more commonly in 1955 than in 1954.

| | | | |
|---|---|---|---|
| Chapleau | 8 | North Bay | 1 |
| Cochrane | 1 | Parry Sound | 2 |
| Fort Frances | 7 | Pembroke | 10 |
| Geraldton | 9 | Port Arthur | 11 |
| Kapuskasing | 1 | Rideau | 19 |
| Kenora | 1 | Sault Ste. Marie | 10 |
| Lake Huron | 11 | Sioux Lookout | 4 |
| Lake Simcoe | 8 | Tweed | 7 |
| Lindsay | 7 | White River | 17 |

***Black-headed Jack-pine Sawfly,*** *Neodiprion pratti banksianae* Roh.—Population levels of this sawfly in northern Ontario declined generally in 1955. Heavy infestations were observed in lake-shore stands of jack pine at Vista Lake, Porter Inlet of Rainy Lake, and Sturgeon Narrows on Sturgeon Lake in the Fort Frances District, and on Great Cloche Island in the Sudbury District. On Great Cloche Island considerable host tree mortality has resulted from five years' severe defoliation. A new heavy infestation was observed on a small island in West Bay, Lake Nipissing, in the North Bay District. A medium infestation at Iron Bridge in the Sault Ste. Marie District in 1954 declined to light intensity in 1955.

In southern Ontario population levels equalled or exceeded those reported in 1954. Jack pine trees in small plantations in Humphrey and Foley townships, Parry Sound District, were heavily defoliated. In the Pembroke District moderate-to-heavy defoliation of the upper 5 to 7 feet of jack pine trees in the Petawawa area occurred for the third consecutive year. A new infestation of medium intensity was reported along the power transmission line in Bronson Township, Pembroke District, where an average of approximately 13 colonies of larvae per tree was observed in a sample plot. Heavy defoliation occurred on a small group of jack pine trees east of Greenock in the Lake Huron District. The heavy infestations in small plantations in McNab and Anglesea townships in the Tweed District persisted in 1955.

| | | | |
|---|---|---|---|
| Chapleau | 18 | Parry Sound | 13 |
| Cochrane | 3 | Pembroke | 14 |
| Fort Frances | 13 | Rideau | 11 |
| Geraldton | 9 | Sault Ste. Marie | 1 |
| Gogama | 3 | Sioux Lookout | 11 |
| Kapuskasing | 5 | Sudbury | 2 |
| Kenora | 17 | Swastika | 1 |
| Lake Huron | 1 | Tweed | 10 |
| North Bay | 1 | White River | 4 |

***Red-headed Jack-pine Sawfly,*** *Neodiprion virginianus* complex.—Open-grown jack pine trees at widely separated locations in the Province were infested by this insect in 1955, but on the whole population levels declined. In the Fort Frances, Port Arthur, and Geraldton districts, however, heavy infestations occurred as follows: at Beaverhouse Lake, in Aylesworth and Richardson townships, Fort Frances District; along Highway 17 east of Kakabeka Falls and north of Orient Bay, Port Arthur District; and in a small group of jack pine trees in Leduc Township, Geraldton District.

| | | | |
|---|---|---|---|
| Chapleau | 1 | Lake Simcoe | 3 |
| Cochrane | 5 | North Bay | 1 |
| Fort Frances | 11 | Port Arthur | 32 |
| Geraldton | 25 | Sault Ste. Marie | 5 |
| Gogama | 4 | Sioux Lookout | 4 |
| Kapuskasing | 5 | Swastika | 2 |
| Kenora | 8 | Tweed | 1 |

***Red-pine Sawfly,*** *Neodiprion nanulus nanulus* Schedl.—For the third consecutive year significant increases in population levels of this sawfly were observed in northern Ontario whereas in southern Ontario little change was evident. The most notable heavy infestations in northwestern Ontario were in the vicinity of Eagle, White Otter, and Sand lakes in the Kenora District; at Standingstone Point, Rainy Lake, in the Fort Frances District; and in Robson and Golding townships in the Port Arthur District. Small pockets of light-to-medium infestation were found at many points in the Gerald-

ton, White River, Gogama, and Chapleau districts. The medium infestation in Hunt Township, White River District, and in Panet Township, Chapleau District, persisted in 1955. An additional medium infestation was reported in Leeson Township in the latter district.

| | | | |
|---|---|---|---|
| Chapleau | 20 | Port Arthur | 40 |
| Fort Frances | 17 | Pembroke | 3 |
| Geraldton | 11 | Rideau | 7 |
| Gogama | 1 | Sioux Lookout | 23 |
| Kapuskasing | 2 | Sudbury | 1 |
| Kenora | 50 | Tweed | 2 |
| Parry Sound | 4 | White River | 26 |

***Swaine's Jack-pine Sawfly,*** *Neodiprion swainei* Midd.—Increases in larval population levels occurred in the North Bay District in 1955 in the Makobe Lake and Jim Edwards Lake areas west of Lady Evelyn Lake and in the Rabbit Lake area east of Temagami. The Rabbit Lake infestation appeared to be an extension of the older Temagami—Lady Evelyn lakes outbreak which showed little or no change in intensity from 1954 when it was classed as medium-to-heavy.

Elsewhere infestations of Swaine's sawfly remained at virtually the same level or declined in intensity compared with 1954. Pockets of light-to-medium infestation persisted in Noble Township, Gogama District. Population levels east of Red Gut Bay on Rainy Lake in the Fort Frances District declined to light intensity in 1955. Colonies of larvae were commonly found in the Chapleau District.

| | | | |
|---|---|---|---|
| Chapleau | 14 | North Bay | 36 |
| Fort Frances | 4 | Sault Ste. Marie | 8 |
| Geraldton | 1 | Sioux Lookout | 1 |
| Gogama | 26 | Sudbury | 5 |
| Kenora | 18 | Swastika | 1 |

***Birch Sawfly,*** *Arge pectoralis* (Leach).—In 1955 reports of severe defoliation of white birch by this insect were confined to the eastern districts of northern Ontario as in 1954. Infestations were heavy at the following locations: on the south shore of Opeepeesway Lake, Chapleau District; in a small stand of white birch at Ivanhoe Lake, Gogama District, and along lake shores at several localities in the Cochrane, Swastika, and North Bay districts.

| | | | |
|---|---|---|---|
| Chapleau | 6 | North Bay | 28 |
| Cochrane | 23 | Parry Sound | 1 |
| Geraldton | 1 | Pembroke | 4 |
| Gogama | 15 | Sault Ste. Marie | 2 |
| Kapuskasing | 1 | Sudbury | 2 |
| Lake Huron | 5 | Swastika | 29 |
| Lindsay | 2 | Tweed | 3 |
| Lake Simcoe | 3 | | |

***Mountain-ash Sawfly,*** *Pristiphora geniculata* (Htg.).—Medium to heavy defoliation occurred on occasional mountain ash trees at many localities in the following districts: North Bay, Parry Sound, Pembroke, Lindsay, Lake Simcoe, and Lake Huron.

| | | | |
|---|---|---|---|
| Lake Huron | 5 | Parry Sound | 6 |
| Lake Simcoe | 1 | Pembroke | 4 |
| Lindsay | 6 | Rideau | 1 |
| North Bay | 1 | Tweed | 1 |

***Eastern Hemlock Looper,*** *Lambdina fiscellaria fiscellaria* (Guen.).—A light infestation persisted on a small island in Lower Lake Abitibi in the Cochrane District where severe defoliation for several years has caused considerable mortality of balsam fir trees.

Hemlock and cedar trees on Bernice Island in the Parry Sound District which had been heavily infested in 1954, were sprayed with DDT in oil on June 28, 1955. Observations made on the island 12 hours following the spray application and a second examination 3 weeks later revealed that the control operation was successful.

| | | | |
|---|---|---|---|
| Cochrane | 1 | Sault Ste. Marie | 2 |
| Kapuskasing | 3 | Sioux Lookout | 2 |
| North Bay | 6 | Tweed | 3 |
| Parry Sound | 6 | White River | 1 |
| Pembroke | 2 | | |

***Black-headed Budworm,*** *Acleris variana* (Fern.).—A few collections of small numbers of this insect were received in 1955 as population levels continued to decline from the peak reached in 1953.

| | | | |
|---|---|---|---|
| Chapleau | 2 | Sault Ste. Marie | 4 |
| Cochrane | 2 | Sioux Lookout | 7 |
| Fort Frances | 4 | Sudbury | 1 |
| Kapuskasing | 1 | Tweed | 1 |
| Kenora | 2 | White River | 1 |
| Parry Sound | 2 | | |

***Jack-pine Budworm,*** *Choristoneura pinus* Free.—There was a marked reduction in the abundance of this insect in the Kenora and Sioux Lookout districts compared with 1954. The heavy infestation at Irregular, Haggart, and Bulging lakes in the Sioux Lookout District declined to light-to-medium intensity. Heavy infestations which occurred near Hudson in the above district and in Mutrie Township in the Kenora District were light in 1955. A light infestation persisted at Blue and Indian lakes, Kenora District.

In the Lake Simcoe District population levels decreased in Scots and jack pine plantations in the Baxter Tract of the Angus Forest, Essa Township. A new heavy infestation 5 acres in extent was reported in a Scots pine plantation in the Brentwood Tract of the same forest.

| | | | |
|---|---|---|---|
| Fort Frances | 3 | Lake Simcoe | 2 |
| Kenora | 6 | Port Arthur | 1 |
| Lake Huron | 1 | Sioux Lookout | 12 |

***Fall Webworm,*** *Hyphantria textor* Harr.—Generally colonies were more commonly found in 1955 than in 1954. Localized light infestations occurred in the Sioux Lookout, Fort Frances, Sault Ste. Marie, and Tweed districts. Two small areas of medium infestation were observed in Township 80, Geraldton District, and in Wilberforce Township, Pembroke District.

| | | | |
|---|---|---|---|
| Chapleau | 2 | North Bay | 13 |
| Cochrane | 17 | Parry Sound | 10 |
| Fort Frances | 14 | Pembroke | 17 |
| Geraldton | 2 | Port Arthur | 2 |
| Gogama | 8 | Rideau | 10 |
| Kenora | 11 | Sault Ste. Marie | 24 |
| Lake Erie | 11 | Sioux Lookout | 1 |
| Lake Huron | 15 | Sudbury | 3 |
| Lake Simcoe | 15 | Swastika | 15 |
| Lindsay | 10 | Tweed | 12 |

***Eastern Tent Caterpillar,*** *Malacosoma americanum* (F.).—A further decline in the abundance of this caterpillar was evident throughout its entire range in Ontario in 1955. No heavy infestations were observed and only pockets of light infestation were present in the southwestern corner of the North Bay District.

| | | | |
|---|---|---|---|
| Lake Erie | 10 | Parry Sound | 17 |
| Lake Huron | 1 | Pembroke | 6 |
| Lake Simcoe | 2 | Rideau | 1 |
| Lindsay | 5 | Sudbury | 5 |
| North Bay | 5 | Tweed | 3 |

***Western Tent Caterpillar,*** *Malacosoma pulviale* (Dyar).—Populations of this insect remained at a low level in northern Ontario in 1955. Only one light infestation persisted and was in Paipoonge Township, Port Arthur District.

| | | | |
|---|---|---|---|
| Chapleau | 4 | Kenora | 2 |
| Cochrane | 15 | Port Arthur | 3 |
| Fort Frances | 3 | Sault Ste. Marie | 3 |
| Geraldton | 3 | Sudbury | 1 |
| Gogama | 9 | Swastika | 9 |
| Kapuskasing | 1 | White River | 2 |

***Fall Cankerworm,*** *Alsophila pometaria* (Harr.).—Defoliation of various broad-leaved trees was less severe in 1955 than in 1954 near Ardendale, Tweed District, and west of Carleton Place in the Rideau District. In both instances only light defoliation occurred in 1955. Populations remained at a low level in the Niagara Peninsula area and in the Lake Huron District except along the Welland River in Binbrook Township where light defoliation was observed. A light infestation reported in 1954 south of Galt in the Lake Huron District declined in intensity in 1955.

In the Western Region light defoliation of Manitoba and silver maples occurred in the towns of Kenora and Fort Frances. Large elm trees in Devlin Township, Fort Frances District, were also lightly defoliated.

In the Lake Simcoe District severe defoliation occurred along the Credit River for the second year. New heavy infestations were reported in a 5-acre woodlot in Bexley Township, Lindsay District, and on a few trees near Maberly in Lanark County, Rideau District.

| | | | |
|---|---|---|---|
| Fort Frances | 2 | Lindsay | 2 |
| Kenora | 1 | Rideau | 8 |
| Lake Erie | 5 | Tweed | 1 |
| Lake Huron | 2 | | |

***Spring Cankerworm,*** *Paleacrita vernata* (Peck).—The heavy infestation persisted on elm trees near Craighurst in Vespra Township, Lake Simcoe District where severe defoliation has occurred for four consecutive years. In the Lindsay District elms in a small area west of Norwood, Asphodel Township, were completely defoliated in 1955.

| | | | |
|---|---|---|---|
| Lake Erie | 3 | Lindsay | 1 |
| Lake Huron | 3 | Rideau | 1 |
| Lake Simcoe | 3 | | |

***Basswood Looper,*** *Erannis tiliaria* (Harr.).—The only infestation of the basswood looper reported in Ontario in 1955 occurred in Jocelyn Township on St. Joseph Island in the Sault Ste. Marie District. Here the looper population was greatly reduced in the late larval stages by a polyhedral virus disease. Few larvae were present in the areas in southern Ontario where heavy infestations were reported in 1954.

| | | | |
|---|---|---|---|
| Lake Erie | 2 | Pembroke | 2 |
| Lake Huron | 1 | Rideau | 4 |
| Lindsay | 1 | Sault Ste. Marie | 11 |
| Parry Sound | 4 | Tweed | 3 |

***Orange-striped Oakworm,*** *Anisota senatoria* (A. & S.).—The only infestations of this insect reported in 1955 were in four townships north and west of Kingston, Tweed District, where bur oak suffered light-to-heavy defoliation, and in the northeastern corner of Bosanquet Township, Lake Erie District, where red and white oaks were lightly defoliated.

| | | | |
|---|---|---|---|
| Lake Erie | 9 | Tweed | 5 |
| Lindsay | 2 | | |

***Green-striped Mapleworm,*** *Anisota rubicunda* (Fabr.).—Infestations of this insect in 1955 occurred almost entirely on red maple understory. Increases in infestation intensity were observed in the North Bay and Pembroke districts. Severe defoliation of red maple and light defoliation of sugar maple occurred from Martin Lake to Merrick Township, North Bay District. Patches of heavy infestation were also observed in the Temagami and Lady Evelyn lakes area. In the Pembroke District severe defoliation occurred in Cameron, Clara, and McKay townships.

Light to medium infestations were reported in seven townships south of Sudbury and in three townships northwest of Webbwood, Sudbury District. Small localized infestations of light intensity occurred in the Parry Sound, Gogama, Sault Ste. Marie, and Fort Frances districts.

| | | | |
|---|---|---|---|
| Fort Frances | 2 | Parry Sound | 1 |
| Gogama | 1 | Pembroke | 9 |
| Lake Huron | 1 | Sault Ste. Marie | 5 |
| Lindsay | 1 | Sudbury | 9 |
| North Bay | 22 | Swastika | 7 |

***Walnut Caterpillar,*** *Datana integerrima* G. & R.—Population levels of this insect increased throughout its range in southern Ontario. Host trees along roadsides in the four southern counties of the Lake Huron District were heavily defoliated and a similar condition was observed in the southern part of the Lake Simcoe District, and in townships bordering on Lake Erie. Inland in the Lake Erie District defoliation was somewhat less severe.

Host trees were heavily defoliated at four points in the Tweed and Rideau districts and a small light infestation occurred on a black walnut hedgerow along Highway 28 south of Fraserville, Lindsay District.

| | | | |
|---|---|---|---|
| Lake Erie | 13 | Rideau | 3 |
| Lake Huron | 13 | Tweed | 3 |
| Lake Simcoe | 4 | | |

***Saddled Prominent,*** *Heterocampa guttivitta* (Wlk.).—The infestation which occurred in 1954 in West Garafaxa Township, Lake Huron District, declined to a light intensity in 1955. Control of this residual population was effected by a chemical spray.

***Aspen Blotch Miner,*** *Lithocolletis salicifoliella* Chamb.—Population levels of this insect in northern and central Ontario were generally low in 1955. Pockets of heavy infestation occurred between French Lake and Turtle River in the Fort Frances District. Small medium infestations were observed at a few places in the Chapleau and Pembroke districts.

| | | | |
|---|---|---|---|
| Chapleau | 2 | Parry Sound | 1 |
| Fort Frances | 6 | Pembroke | 7 |
| Geraldton | 1 | Port Arthur | 1 |
| Kenora | 8 | Sault Ste. Marie | 1 |
| Lindsay | 1 | Sioux Lookout | 6 |
| North Bay | 1 | White River | 5 |

***Birch Leaf Miner,*** *Fenusa pusilla* (Lep.).—In recent years this sawfly has been reported as having severely damaged birch foliage in some areas of southern and northeastern Ontario. It has now been determined that infestation by *F. pusilla* and another related species, *Profenusa alumna* (MacG.), has been attributed to the former species only. From records accumulated during the summer of 1955 the birch leaf miner does not appear to occur commonly outside of southern Ontario.

In 1955 gray birches in Glengarry, Stormont, Dundas and Grenville counties and on islands in the St. Lawrence River, Rideau District, were severely infested. Population levels were reported to be higher in 1955 than in 1954. A similar trend was also reported from the Parry Sound and Lindsay districts where white birch was affected. Several pockets of light and medium infestation were observed in the former district.

| | | | |
|---|---|---|---|
| Lake Erie | 2 | Pembroke | 1 |
| Lake Simcoe | 5 | Rideau | 3 |
| Lindsay | 5 | Sudbury | 1 |
| Parry Sound | 11 | Tweed | 2 |

***A Leaf Miner on Birch,*** *Profenusa alumna* (MacG.).—This sawfly species whose association with its proper host, white birch, was first discovered in 1955 appears to be commonly distributed in northeastern Ontario from the White River and Sault Ste. Marie districts east to the Quebec boundary. It occurs less frequently in the districts of Parry Sound and Pembroke and southward.

A review of the status of this insect in recent years is desirable because infestations have been confused with those of *Fenusa pusilla* (Lep.). A heavy infestation on white birch trees in the vicinity of Sault Ste. Marie was first reported in 1948. Increases in the extent of the outbreak in the southern part of the Sault Ste. Marie District occurred each year until 1953 when declines were recorded. In that year the infestation occurred only between the Goulais and Mississagi River watersheds. In 1954 the area of heavy infestation was not so great but population levels remained high. This trend was continued in 1955 when only a relatively small medium-to-heavy infestation was observed between Chippewa Falls and Montreal River, north of Sault Ste. Marie. Elsewhere in the Central Region this leaf miner has been found commonly during the last three years. In 1955 medium-to-heavy infestations were detected in Panet, Chapleau, Nimitz, and 9D townships in the Chapleau District and numerous light infestations were reported in other areas of the district. A single medium-to-heavy infestation was reported in the Gogama District in Ivanhoe Township. In 1955 a heavy infestation occurred along the shore of Lake of Bays near Glenmount in the Parry Sound District.

| | | | |
|---|---|---|---|
| Chapleau | 11 | North Bay | 10 |
| Cochrane | 2 | Parry Sound | 4 |
| Gogama | 1 | Pembroke | 4 |
| Kapuskasing | 2 | Sault Ste. Marie | 15 |
| Lake Erie | 1 | Sudbury | 1 |
| Lake Huron | 2 | Tweed | 2 |

***Birch Leaf-mining Sawfly,*** *Heterarthrus nemoratus* (Fall.).—An outbreak of this species occurred on white birch trees along the shore of Oliphant Bay on the Bruce Peninsula, Lake Huron District. It was also found on white and yellow birches near Sault Ste. Marie.

| | | | |
|---|---|---|---|
| Lake Huron | 3 | Sault Ste. Marie | 2 |

***Walkingstick,*** *Diapheromera femorata* Say.—As in 1951 and 1953 heavy infestations of this biennial defoliator occurred on broad-leaved trees west of Cape Croker on Bruce Peninsula, Lake Huron District; west of Castleton in Northumberland County and near Pontypool in the Ganaraska Forest, Durham County, in the Lindsay District. A heavy infestation was also observed in Whitechurch Township east of Aurora in the Lake Simcoe District where hardwood species in a 100-acre woodlot were stripped of their foliage.

| | | | |
|---|---|---|---|
| Lake Huron | 4 | Lindsay | 2 |
| Lake Simcoe | 1 | | |

***Birch-leaf Skeletonizer,*** *Bucculatrix canadensisella* Chamb.—The heavy infestations which occurred in several districts in northeastern Ontario in 1954 declined to light intensity in 1955. These reductions were most notable in Kapuskasing, Chapleau, and Gogama districts where the foliage of trees in extensive white birch stands had been severely discolored in 1954.

| | | | |
|---|---|---|---|
| Chapleau | 17 | Kapuskasing | 5 |
| Cochrane | 2 | Sioux Lookout | 1 |
| Geraldton | 1 | White River | 1 |
| Gogama | 1 | | |

***Smaller European Elm Bark Beetle,*** *Scolytus multistriatus* (Marsh.).—In 1955 this beetle was collected in Essex, Kent, Lambton, and Middlesex counties of the Lake Erie District. It has now been found in all counties of this district west of Elgin and Middlesex.

***American Poplar Leaf Beetle,*** *Gonioctena americana* Schaeff.—Population levels of this insect were highest in the Gogama District where heavy infestations occurred on small trembling aspen trees at many points. Localized light infestations were reported in the Kapuskasing, Chapleau, and Lindsay districts.

| | | | |
|---|---|---|---|
| Chapleau | 7 | Parry Sound | 9 |
| Cochrane | 10 | Pembroke | 4 |
| Geraldton | 2 | Port Arthur | 5 |
| Gogama | 6 | Sault Ste. Marie | 3 |
| Kapuskasing | 4 | Sioux Lookout | 1 |
| Lake Simcoe | 2 | Tweed | 1 |
| Lindsay | 1 | White River | 3 |
| North Bay | 1 | | |

***Large Aspen Tortrix,*** *Archips conflictana* (Wlk.).—Larvae of this insect caused heavy defoliation of trembling aspen and understory alder in a 300-acre stand in Herrick Township, Sault Ste. Marie District.

| | | | |
|---|---|---|---|
| Cochrane | 1 | Port Arthur | 1 |
| Lake Simcoe | 1 | Sault Ste. Marie | 2 |
| Lindsay | 1 | Sudbury | 3 |
| Parry Sound | 1 | White River | 1 |

***Rusty Tussock Moth,*** *Orgyia antiqua* (L.).—Severe defoliation of larch trees at two points in St. Edmund Township on the west shore of the Bruce Peninsula, Lake Huron District, was observed in 1955. The larvae of this insect feed on a wide variety of coniferous and broad-leaved trees, but seldom occur in large numbers.

| | | | |
|---|---|---|---|
| Chapleau | 1 | Lindsay | 1 |
| Geraldton | 1 | North Bay | 3 |
| Kapuskasing | 1 | Parry Sound | 1 |
| Kenora | 1 | Sault Ste. Marie | 10 |
| Lake Huron | 3 | White River | 1 |

***Balsam Bud-mining Sawfly,*** *Pleroneura borealis* Felt.—The damage to new shoots of balsam fir by this insect is similar in appearance to that caused by late spring frosts. Curling and browning of new shoots was evident in numerous localities in Ontario. Damage was evident in Haliburton, Victoria, and Peterborough counties in the Lindsay District, and west of Pembroke.

| | | | |
|---|---|---|---|
| Kenora | 3 | Pembroke | 5 |
| Lake Simcoe | 2 | Sault Ste. Marie | 1 |
| Lindsay | 7 | Sioux Lookout | 1 |
| North Bay | 3 | Sudbury | 3 |
| Parry Sound | 3 | Tweed | 6 |

***Yellow-necked Caterpillar,*** *Datana ministra* Dru.—This caterpillar was found more commonly in 1955 than in 1954 in the Pembroke and Parry Sound districts. In the former district white elms and hawthorns along Highway 17 south of Pembroke were severely defoliated. In the latter district yellow birch, white birch, red oak, white elm, and apple trees at many places along roads were partially defoliated. Defoliation of small trees was often severe.

| | | | |
|---|---|---|---|
| Gogama | 1 | Pembroke | 4 |
| Kenora | 1 | Rideau | 3 |
| Lake Erie | 1 | Sault Ste. Marie | 2 |
| Lake Simcoe | 1 | Sioux Lookout | 1 |
| North Bay | 4 | Swastika | 1 |
| Parry Sound | 9 | Tweed | 2 |

***Ugly-nest Caterpillar,*** *Archips cerasivorana* (Fitch).—A heavy infestation of this tent-making caterpillar occurred on roadside cherry trees in the Blackwater Lake area of Leduc Township, Geraldton District.

| | | | |
|---|---|---|---|
| Chapleau | 2 | Lindsay | 2 |
| Cochrane | 1 | North Bay | 1 |
| Fort Frances | 1 | Parry Sound | 4 |
| Geraldton | 2 | Pembroke | 10 |
| Gogama | 1 | Port Arthur | 7 |
| Kapuskasing | 10 | Rideau | 4 |
| Kenora | 1 | Sault Ste. Marie | 2 |
| Lake Erie | 3 | Sudbury | 3 |
| Lake Huron | 13 | Tweed | 7 |
| Lake Simcoe | 1 | White River | 2 |

***Cecidomyiid Needle Midges on Red Pine.***—Unidentified midges have caused considerable damage to plantation red pine in some areas of Sault Ste. Marie and Sudbury districts. Needles attacked by these midges turn red in the autumn and then drop from the trees. In the Sault Ste. Marie District particularly, needle damage was conspicuous in Lefroy, Kirkwood, and Rose townships, while in the Sudbury District, the main centers of infestation were at Nairn and Burwash. In the latter area populations appeared to have declined sharply from the high level observed in 1954.

## LIST OF CO-OPERATORS

| | | |
|---|---|---|
| Ablett, D. | Backwith, A. | Begin, G. W. |
| Adlam, W. D. | Baker, R. M. | Bell, J. W. |
| Aho, D. | Ball, G. | Bell, J. G. |
| Albert, G. | Banks, G. W. | Bellvance, P. |
| Ames, D. | Barker, J. | Benner, F. |
| Anderson, H. | Barlow, J. J. | Benner, J. K. |
| Anderson, J. | Baron, A. P. | Betrand, D. |
| Arbuckle, C. | Bartlett, C. O. | Bliss, D. |
| Armstrong, R. H. | Bastedo, W. | Booker, S. |
| Aro, A. | Beck, C. O. | Borup, P. |
| Autio, | Beck, T. | Brady, R. B. |

## LIST OF CO-OPERATORS—Continued

Brady, V. E.
Breshenham, G.
Brophy, D.
Brown, J. L.
Bruce, E.
Bullock, G. W.
Byers, L.

Cameron, H. A.
Cameron, R. E.
Campbell, B.
Campbell, G.
Cannon, F. E.
Carman, R. S.
Carmichael, A. J.
Chalk, A. W.
Chellew, B.
Christie, W. D.
Chornopaki, R.
Chubb, M.
Clancey, P.
Clerk, E.
Coates, K.
Conway, C.
Cooke, T. C.
Cosco, E.
Costello, W.
Cote, A.
Cousineau, L.
Craig, J.
Crealock, A.
Cressman, E. M.
Cringan, A. T.
Curtiss, B.

Dance, B. D.
Dance, E.
Davidson, P. R.
Dawson, J.
Dewdry, D. B.
deVries, H. H.
Dikirk, M.
Dingee, G.
Dodds, F. M.
Doucette, W.
Duckworth, C.
Duff, R.
Durette, S.

Echel, L.
Elsey, E.
Elson, G. E.
Endecott, G. R.
Ethier, G.
Ervin, E.
Evanush, E.
Everitt, W.

Fenton, T.
Ferguson, J.
Fleming, G. O.
Forman, W.
Fortier, D. S.
Fowler, M. J.
Fox, C. J.
Fraser, D. A.
Friedoff, J. E.
Fullerton, W. K.

Gage, D. E.
Gair, J.
Galbraith, B.
Gander, E. M.
Gardiner, E.
Gardippie, M.
Gate, C.
Gibson, G.
Gillies, F.
Girvan, T.
Goodman, C.
Goodman, D.
Gordon, A.
Gorman, S.
Govtal, A. S.
Graham, H.
Grawbarger, B.
Green, H. W.
Greenwood, G. T.
Greer, R.
Grey, P.
Griffiths, J. D.
Grinnell, H. R.
Groves, C. R.

Hammel, H.
Hamill, J.
Hanson, S. W.
Hare, P. J.
Harris, E.
Harris, W. G.
Harper, D.
Harvey, S.
Hatfield, J.
Hawley, W. D.
Hazel, J.
Heintzman, H.
Henry, E.
Herbert, L.
Higgins, R.
Hoben, D.
Hohner, P.
Holliday, F.
Holmberg, H.
Hoover, H.
Horne, A.
Howard, C. P.
Howard, E.
Huber, H.
Hughes, D.
Hughes, M.
Hulsmaris, R.
Hummel, R. W.
Hunter, H.
Hutchinson, H.

Ibey, L. W.

Jackson, A.
Jacquest, R. G.
Jaliquette, W. G.
Janes, D.
Janser, F.
Jarrow, R.
Jarvis, L.
Johnston, E. F.

Kasari, V.
Katerick, B.
Kaukinen, R.
Kennedy, P. J.
Kern, F.
Kibley, R.
King, J. P.
Kinsey, J. R.
Kintreu, J.
Kirk, M.
Kitchenbra, J.
Kokocinski, H.
Koski, T.
Kotola, M.

Labbe, A.
LacSeul, S.
Lafleur, E.
Lambert, G.
Lamonte, J.
Lane, C. H.
Lapenskie, B. J.
Larson, E.
Larssen, H.
Launsbury, D.
Lautenslager, E.
Lawson, J.
Lawson, M.
Lea, J.
Lewis, E. H.
Libby, G.
Linklater, C.
Linklater, T.
Littlefield, B.
Long, N. F.
Long, G.
Lucas, J.
Lundmark, A.
Lyon, J. W.
Lyon, N. F.

MacDonald, C.
MacDonald, J. C.
MacDonald, L. P.
MacDonald, M.
MacDonald, R.
MacKay, D.
MacLeod, J.
Maitland, E.
Malby, R.
Malkin, V.
Mallery, J. A.
Malsi, W.
Masterson, P. G.
McCarron, M. J.
McClelland, A. R.
McClelland, M.
McCormack, R. J.
McCormick F. H.
McGaughey, J.
McGoey, A. J.
McGown, T.
McKay, D.
McLaren, D.
McLeod, G.
McNabb, H.
McWatch, H.
Mellick, O.
Middlemiss, M.
Millard, A. S.
Miller, G.

## LIST OF CO-OPERATORS—Concluded

Monaham, V.
Monk, C. A.
Monk, T.
Moorhouse, K. G.
Morin, D. J.
Morin, H.
Morrison, C. R.
Murray, P. M.
Murphy, J.

Nadeau, W.
Nadon, A.
Nelson, J. H.
Nereroff, N.
Nicholson, M. A.
Noble, A.
Nodwell, S.
Nodwell, W.
Nott, R.
Nystrom, H. O.

Obrey, L.
Orchard, B.
Osborne, M.

Pakenhaw, A. B.
Papineau, A.
Park, D.
Parke, L.
Parris, T.
Patterson, R. H.
Peacock, D.
Pearce, G. A.
Pearson, D.
Peart, R.
Pelletier, P.
Pencoff, G.
Phillips, J.
Piche, G.
Pigion, L.
Poitras, G.
Price, H.
Purcel, D.
Purcell, C.

Racoy, H. C.
Readman, H. K.
Redding, H.
Reetz, H.
Reid, R.
Rennie, J. H.
Reynolds, H. G.
Reynolds, J. R.
Rheal, B.
Ringham, L.
Roach, B.
Roberts, J.
Robson, A.
Rogers, P. M.
Rothwell, R. C.
Ruddy, H. A.
Rudham, E.
Russell, A. A.

St. Piere, L.
Samson, G.
Saunders, L. A.
Schaeffer, O.
Schauber, G.
Schneller, G. B.
Schulz, W.
Self, A.
Senecal, F.
Shalher, J. J.
Shalla, J.
Sillers, C.
Sinclair, G.
Sinclair, M.
Silvaggio, A.
Smith, R.
Synder, A. P.
Sparling, W. H.
Springer, H.
Stacey, F.
Steele, W. E.
Stewart, D.
Strickland, J.
Stuart, H.
Suter, S.

Tate, T.
Taylor, J. M.
Thain, R.
Thompson, D.
Thompson, R. F.
Thorizimson, F.
Thurston, W.
Tremblay, F.
Trodd, L. L.
Trulove, R.
Trussler, D.
Turnbul, N. J.
Turner, D.
Turner, G.
Turner, J.

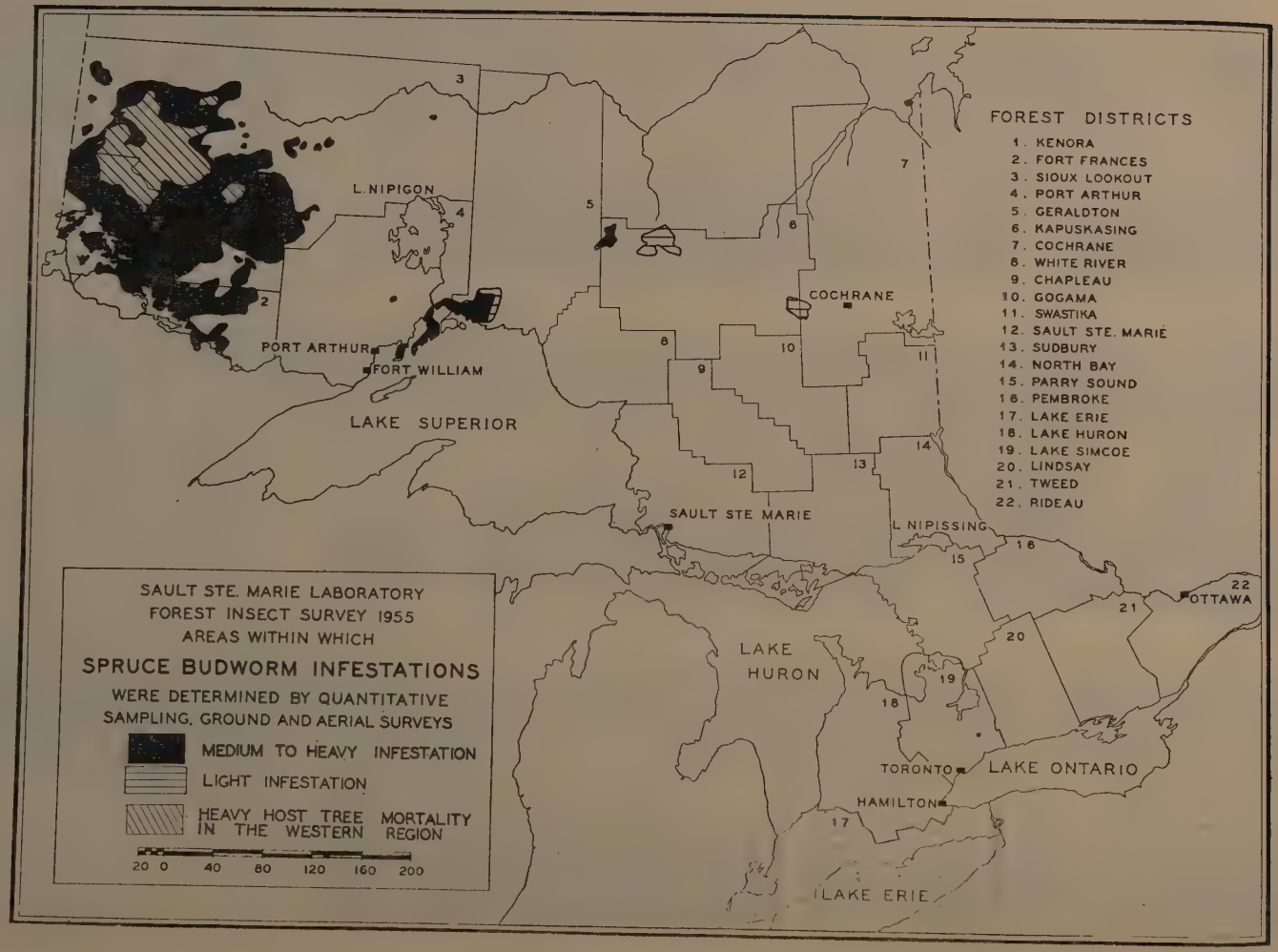
Unger, H.

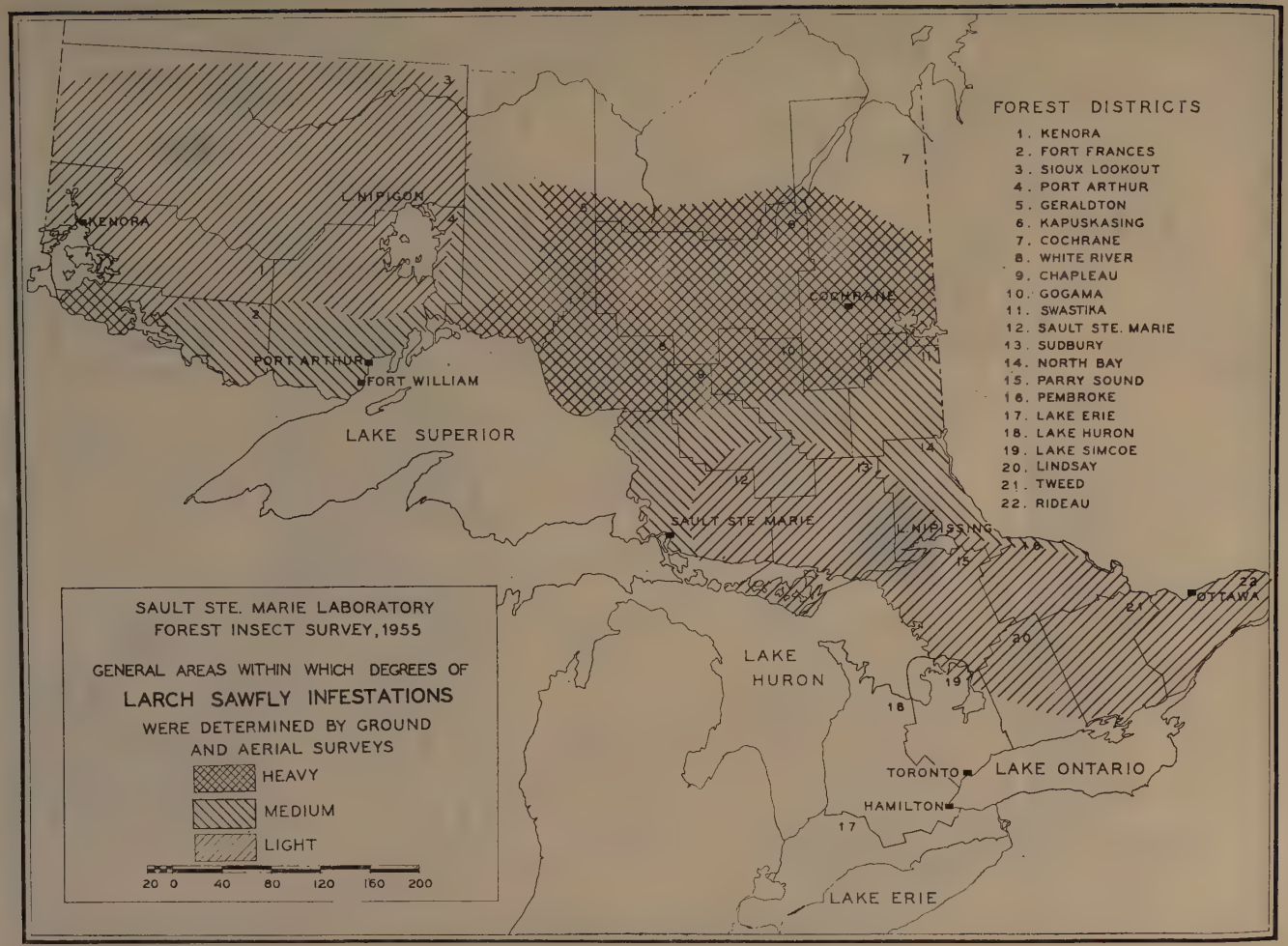
Valiquette, V.
Vance, D. J.
VanEvery, J.

Wahner, D.
Walden, F. A.
Walroth, A. E.
Webb, H.
Weegar, C.
Welsh, O. K.
Western, H.
Weylie, W.
Whitnell, J.
Wickstrom, A.
Williams, D.
Williams, J.
Williams, T.
Wilson, B.
Wilson, D.
Wilson, V. L.
Wingle, H.
Winters, E. S.
Wohlgemuth, E.
Wolters, F.
Wood, C. J.
Woodall, R.
Wright, A.
Wylie, W.

Yaskovitch, N. P.

Zavitz, H.


FOREST DISTRICTS
1. KENORA
2. FORT FRANCES
3. SIOUX LOOKOUT
4. PORT ARTHUR
5. GERALDTON
6. KAPUSKASING
7. COCHRANE
8. WHITE RIVER
9. CHAPLEAU
10. GOGAMA
11. SWASTIKA
12. SAULT STE. MARIE
13. SUDBURY
14. NORTH BAY
15. PARRY SOUND
16. PEMBROKE
17. LAKE ERIE
18. LAKE HURON
19. LAKE SIMCOE
20. LINDSAY
21. TWEED
22. RIDEAU
L. NIPIGON
PORT ARTHUR
FORT WILLIAM
LAKE SUPERIOR
COCHRANE
SAULT STE MARIE
L. NIPISSING
OTTAWA
LAKE HURON
TORONTO
LAKE ONTARIO
HAMILTON
LAKE ERIE
SAULT STE. MARIE LABORATORY
FOREST INSECT SURVEY 1955
AREAS WITHIN WHICH
SPRUCE BUDWORM INFESTATIONS
WERE DETERMINED BY QUANTITATIVE
SAMPLING, GROUND AND AERIAL SURVEYS
MEDIUM TO HEAVY INFESTATION
LIGHT INFESTATION
HEAVY HOST TREE MORTALITY
IN THE WESTERN REGION
20 0 40 80 120 160 200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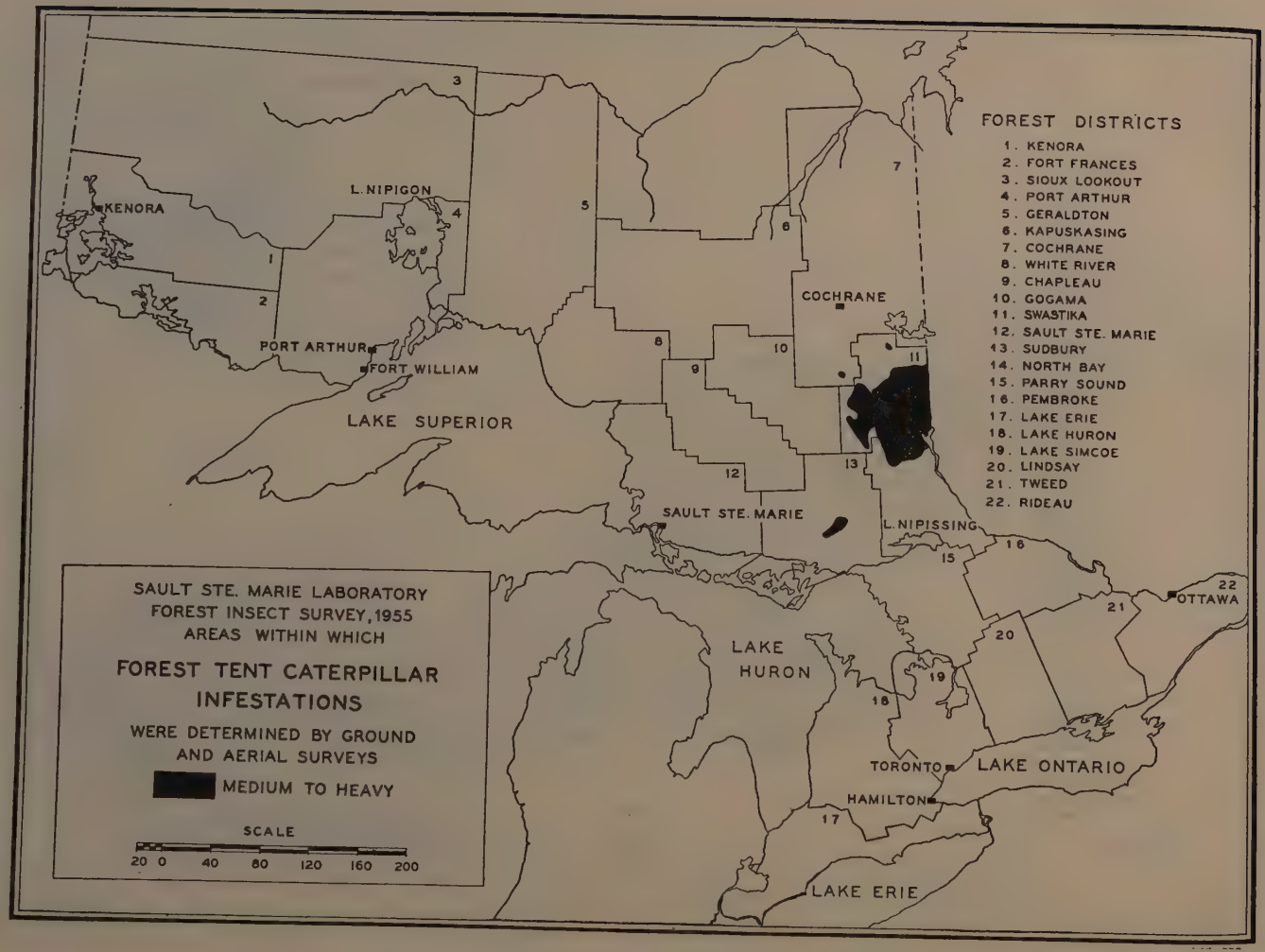
LAKE SUPERIOR
COCHRANE
SAULT STE MARIE
L. NIPISSING
OTTAWA
LAKE HURON
TORONTO
LAKE ONTARIO
HAMILTON
LAKE ERIE
SAULT STE. MARIE LABORATORY
FOREST INSECT SURVEY, 1955
GENERAL AREAS WITHIN WHICH DEGREES OF
LARCH SAWFLY INFESTATIONS
WERE DETERMINED BY GROUND
AND AERIAL SURVEYS
HEAVY
MEDIUM
LIGHT
20 0 40 80 120 160 200


FOREST DISTRICTS
1. KENORA
2. FORT FRANCES
3. SIOUX LOOKOUT
4. PORT ARTHUR
5. GERALDTON
6. KAPUSKASING
7. COCHRANE
8. WHITE RIVER
9. CHAPLEAU
10. GOGAMA
11. SWASTIKA
12. SAULT STE. MARIE
13. SUDBURY
14. NORTH BAY
15. PARRY SOUND
16. PEMBROKE
17. LAKE ERIE
18. LAKE HURON
19. LAKE SIMCOE
20. LINDSAY
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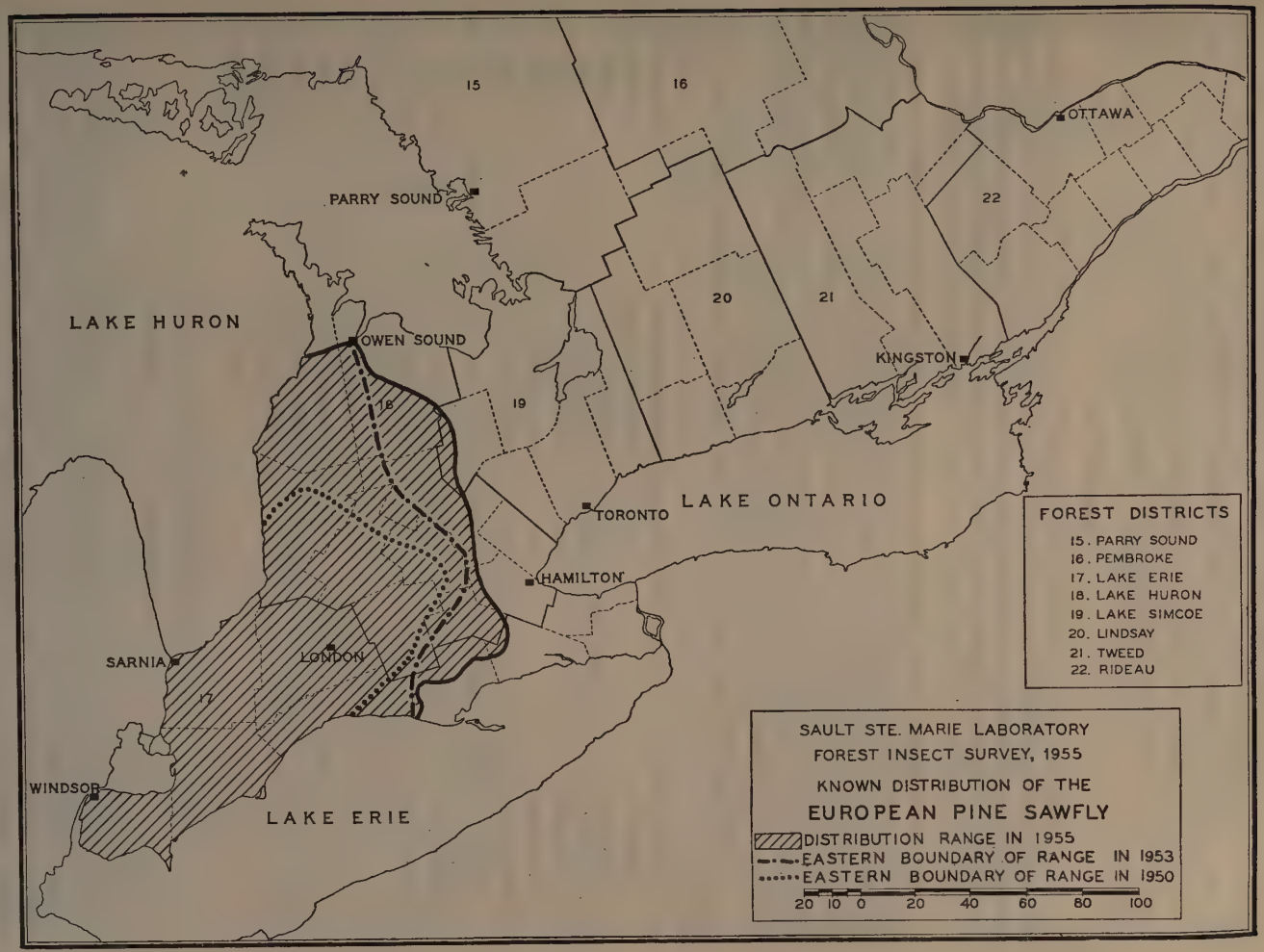
22. RIDEAU
L. NIPIGON
KENORA
PORT ARTHUR
FORT WILLIAM
LAKE SUPERIOR
COCHRANE
SAULT STE. MARIE
L. NIPISSING
OTTAWA
LAKE HURON
TORONTO
LAKE ONTARIO
HAMILTON
LAKE ERIE
SAULT STE. MARIE LABORATORY
FOREST INSECT SURVEY, 1955
AREAS WITHIN WHICH
FOREST TENT CATERPILLAR
INFESTATIONS
WERE DETERMINED BY GROUND
AND AERIAL SURVEYS
MEDIUM TO HEAVY
SCALE
20 0 40 80 120 160 200


15
16
OTTAWA
PARRY SOUND
22
LAKE HURON
20
21
OWEN SOUND
KINGSTON
18
19
TORONTO
LAKE ONTARIO
HAMILTON
SARNIA
LONDON
17
WINDSOR
LAKE ERIE
FOREST DISTRICTS
15. PARRY SOUND
16. PEMBROKE
17. LAKE ERIE
18. LAKE HURON
19. LAKE SIMCOE
20. LINDSAY
21. TWEED
22. RIDEAU
SAULT STE. MARIE LABORATORY
FOREST INSECT SURVEY, 1955
KNOWN DISTRIBUTION OF THE
EUROPEAN PINE SAWFLY
DISTRIBUTION RANGE IN 1955
EASTERN BOUNDARY OF RANGE IN 1953
EASTERN BOUNDARY OF RANGE IN 1950
20 10 0 20 40 60 80 100

# PROVINCE OF ONTARIO

## FOREST DISEASE SURVEY

H. H. V. Hord and D. A. Quirke

*Forest Pathology Laboratory, Maple, Ont.*

### INTRODUCTION

The information on forest tree diseases included in this report is based principally on the collections and reports received by the Forest Disease Survey and supplied largely by the forest biology ranger staff. Valuable assistance was also received from personnel of the Department of Lands and Forests, and from private individuals. The rangers submitted 4,383 of the 4,932 collections.

Where fruiting bodies were present they were used as the basis for identification; where lacking, isolation of the causal organism in pure culture from the diseased tissue was attempted. The cultural method was used particularly to verify the presence of *Fomes pini* (Thore) Lloyd in samples of "buttermilk" decay and of *Coniophora puteana* (Schum. ex Fries) Karst. in samples of brown cubical rot of eastern white cedar. Isolations were also made from 1,150 damped-off nursery seedlings collected in conjunction with the Survey.

The distribution of the 1955 collections among the principal host trees was as follows:

| Coniferous trees | Collections | Broad-leaved trees | Collections |
|---|---|---|---|
| Balsam fir | 424 | Trembling aspen | 1,257 |
| White pine | 274 | White birch | 590 |
| Jack pine | 238 | Sugar maple | 348 |
| Black spruce | 181 | Yellow birch | 199 |
| White spruce | 98 | Red maple | 145 |
| Red pine | 59 | White elm | 136 |
| Eastern hemlock | 46 | Alder | 91 |
| Eastern white cedar | 38 | Beech | 90 |
| Scots pine | 26 | Willow | 68 |
| Others | 39 | Largetooth aspen | 67 |
| Total | 1,423 | Ironwood | 61 |
| | | Red oak | 57 |
| | | Manitoba maple | 52 |
| | | Balsam poplar | 40 |
| | | Others | 200 |
| | | Total | 3,401 |

Miscellaneous hosts ..... 108

Grand Total ..... 4,932

As in 1954, attention was concentrated on adding to the knowledge of the hosts and geographic ranges of three diseases of national importance namely, hypoxylon canker of poplar, red ring rot of conifers, and white heart rot of hardwoods. So much information has now been accumulated on these diseases that further general collections would be of little value. A change in emphasis is therefore proposed for 1956. Quantitative sampling and the use of permanent sample plots were introduced in 1955 and will be expanded further.

In general, rainfall was above average in the three western districts in May, and in the area north of Kenora, Nipigon, and Iroquois Falls in June. Elsewhere, precipitation was well below normal through May, June, and July. In August, precipitation was below normal only in the Western and Northern regions, and in September precipitation was below normal in southern Ontario and in the Northern and Central regions. In addition, monthly mean temperatures from May to August were generally above normal throughout the Province. As a result, the effects of insufficient moisture could be seen at some time during the season in most areas of the Province.

The general effect of these climatic conditions was to reduce the amount of leaf and needle infection by leaf spot and rust fungi. Exceptions were apparent in those areas receiving more moisture at the time of sporulation. Fruiting of fungi already established was also greatly reduced by the lack of moisture during late spring and early summer.

Early discoloration and fall of leaves of sugar maple, white birch, white elm, and trembling aspen was noted on dry sites in the Rideau, Tweed, and Sudbury districts in July and in the Sault Ste. Marie, North Bay, and Lake Simcoe districts in August. Cedar, white pine and white spruce reproduction, up to a foot high, was killed in parts of the Rideau and Tweed districts. Scattered saplings of trembling aspen, white birch, white elm and sugar maple on dry sites were killed in all but the northwestern districts. The dry weather was instrumental in causing the death of plantation trees of 6 years of age or younger, and a high percentage of the 1955 transplants in many of the southern districts. White pine and larch were reported as most susceptible to this type of damage.

During the height of the fire season, heat from fires could be felt for long distances and in the northwest portion of the Sudbury District contributed to the drying of much of the foliage.

In the Lake Erie District, needle browning of larch and sunscald of hardwoods in thinned stands followed the unusually high summer temperatures.

In the Rideau and Tweed districts, the early foliage of white ash, black ash, butternut, hickory, walnut, balsam fir, and larch was damaged by frost following the abnormally warm weather in late April and early May. Light frosts in an area extending from Bruce Mines to Sault Ste. Marie damaged from 50 to 90 per cent of the early leaves of red oak. Foliage of aspen, birch, maple balsam fir, and larch that had begun to develop at that time were unaffected. Ash, basswood, elm, and ironwood were unaffected as their buds had not yet opened.

## IMPORTANT DISEASES

***Hypoxylon Canker of Poplar.***—During 1955, additional collections were made from trees infected by *Hypoxylon pruinatum* (Klotzsch) Cke. for the purpose of comparing growth rates of infected trees with those of nearby healthy trees. Measurements will be made on these during the winter months. Collections were also made in townships from which collections had not previously been made. Since 1951, a total of 1,103 collections of *H. pruinatum* have been made in 771 townships in the 22 forest districts. In several of the southern districts collections have been obtained from every township, whereas in the north collections have only been obtained from those areas accessible by road or aeroplane. Under poor growing conditions, a high percentage of infection

may be caused by *H. pruinatum* in the north as well as the south. This has been shown by the examination of one-tenth-acre plots set out in trembling aspen stands in various forest districts. The following table summarizes the data obtained from selected plots.

| District | Trees per Sq. Chain | Percentage attacked by *H. pruinatum*. |
|---|---|---|
| Lake Erie | 163 | 35 |
| Lake Simcoe | 274 | 65 |
| Lindsay | 84 | 45·3 |
| Parry Sound | 144 | 30·6 |
| Chapleau | 26 | 29·6 |
| Swastika | 128 | 23·1 |
| Gogama | 42 | 19 |
| Kapuskasing | 113 | 24·8 |
| White River | 44 | 54·5 |

Of the 1,103 collections, 1,045 were obtained from trembling aspen, 23 from yellow birch, 20 from white birch, 14 from largetooth aspen and one from balsam poplar. Practically all collections were obtained from trees in the 2- to 4-inch diameter classes.

In the southern part of the Province, trembling aspen has been relegated to poor sites as a result either of agricultural demands or of natural selection. In the north, however, where a much smaller percentage of the land is under cultivation and where there is a limited number of other tree species, trembling aspen is found on good sites. On these sites, very little hypoxylon is found. Hypoxylon is most common on open grown or partially shaded trees growing on dry sites. A high percentage of this year's collections was made from trees growing on soils which were physiologically dry because of the amount of pore space or shallowness.

From the data now available, it is apparent that *H. pruinatum* is of common occurrence throughout the range of trembling aspen in Ontario. On hosts other than trembling aspen and on trees of this species over 6 inches D.B.H., it is of limited importance. It is proposed to direct future studies towards determining the effect of hypoxylon on stocking of trembling aspen stands.

***Red Ring Rot of Conifers.***—Collections of *Fomes pini* (Thore) Lloyd, the cause of red ring rot of conifers, have now been obtained from 108 townships, with representation from all the forest districts except Lake Erie. Seventy per cent of the collections were obtained from white pine and jack pine, but collections were also obtained from red pine, black spruce, white spruce, larch, hemlock, balsam fir, and white cedar. In previous years, relatively few records of the fungus were obtained in Ontario, because of the low rate of production of sporophores. This year, in order to accelerate the accumulation of data on this organism, samples of the typical "buttermilk rot" produced by this fungus were collected. As a result, 111 collections were obtained; more than half were identified by culturing the decayed wood. Although sporophores were rarely found, it was concluded that *F. pini* is one of the primary causes of decay of conifers in Ontario.

To substantiate this conclusion attempts were made to obtain an estimate of the numbers of trees infected in various localities. In the Kenora District examination of stumps of recently cut jack pine trees averaging 9 inches D.B.H., in four plots measuring a square chain each, showed that the characteristic decay was present in the butt log in 4, 26, 34, and 44 per cent of the trees. In the last-mentioned plot, where the stand consisted of a mixture of jack pine and black spruce, only 9 per cent of the spruce trees showed signs of decay in the

butt. In Kowkash Township, Gogama District, more than 50 per cent of the mature jack pine, in a mixed stand with black spruce, was culled because of the presence of decay, whereas the black spruce trees in the stand were sound. Two similar plots in the Sudbury District showed decay in only 1 and 3 per cent of the jack pine. In another Gogama plot, 25 per cent of the jack pine in a square-chain plot showed characteristic *F. pini* rot in the butt. Thirty-one per cent of the 25 logs examined on skidways at each of 5 locations in this area exhibited similar symptoms. Examination of a square chain plot in a stand of white pine, averaging 36 inches D.B.H., indicated the presence of the rot in 44 per cent of the trees. A further check on a total of 150 white pine logs lying in a skidway showed that 45 per cent had visible symptoms of red ring rot.

In the White River District, square-chain plots in Welsh, Mikano, and Magone townships where the jack pine and black spruce averaged 12·6, 8·5, and 5·7 inches in diameter, *Fomes pini* infection was 62·5, 29·6, and 15·9 per cent respectively.

***White Trunk Rot of Hardwoods.***—In 1955, attention was concentrated for the second year on obtaining information concerning the geographic and host range of *Fomes igniarius* (L. ex Fr.) Gill. Of the 1,019 collections of the fruiting body of this fungus made up to the present time, 522 were obtained this year; 546 of the total were found on trembling aspen and 147 on white birch. Collections of fruiting bodies were also obtained from black ash, white ash, largetooth aspen, basswood, beech, blue beech, yellow birch, butternut, eastern choke cherry, rock elm, white elm, shagbark hickory, honey-locust, ironwood, mountain maple, red maple, striped maple, sugar maple, mountain ash, black oak, scrub oak, white oak, and balsam poplar. Ninety per cent of the collections were made from trees between 4 and 14 inches D.B.H. Fruiting bodies were occasionally found on suppressed trembling aspen, white birch, and ironwood in the 1-, 2-, and 3-inch diameter classes.

The collections made to date have been obtained from 517 townships representing all 22 forest districts. It seems, therefore, that these collections adequately demonstrate that *F. igniarius* occurs throughout the range of hardwoods in Ontario. Collections also show the extremely wide host range of the fungus.

Plots in mature trembling aspen stands in Carling and Mowat townships of the Parry Sound District showed that 12 and 52 per cent, respectively, of the trees sampled bore fruit bodies of *F. igniarius*. In the Swastika District, 14 per cent of the trees within a 2-square-chain plot in a mature stand of trembling aspen, bore typical fruit bodies.

In view of the information now available no further collections of *F. igniarius* are required for the purpose of establishing host or geographic ranges for this fungus.

***Canker and Dieback of Balsam Fir.***—In the 1954 Report, reference was made to a canker and dieback of balsam fir which was common throughout central Ontario. An intensive survey during the past season has revealed that this dieback is fairly common throughout the range of balsam fir in Ontario. One hundred and twenty-eight collections from trees so affected were made in 81 townships distributed through 17 forest districts. Eighty-five per cent of the collections were secured from trees 4 inches or less in D.B.H., but trees up to 11 inches, D.B.H., were attacked.

While damage was scattered and usually only single trees were involved, occasionally small groups of trees were killed. On a square-chain plot in Stafford Township, Pembroke District, only 7 out of 58 balsam fir trees, averaging 1 inch or less in diameter, were still alive. Thirty-one of the dead trees bore the characteristic fruiting bodies of the fungus. In the Kapuskasing District,

two plots were laid out in Fauquier Township and one in McMillan Township. In the Fauquier plots, where the average diameter of trees was 3 and 4 inches, the percentage of trees attacked was 20·6 and 42·9, respectively. In the McMillan plot, 40·5 per cent of the trees, averaging 2·6 inches D.B.H., were affected.

Affected trees showed a characteristic reddish discoloration of part or all of the needles in the crown. In 1954, many of the trees showed a dieback of the upper one or two feet of the leader with a constriction of the bark at the point where the dead and healthy tissue adjoined. This condition was observed in 1955, but many of the trees were completely dead. The glossy reddish-brown needles adhere to the branches for long periods after death. Although two or three years' terminal growth may be lost, the growth of a lateral bud produces a terminal replacement. In some trees this terminal dieback and recovery had occurred a number of times prior to death. In rare cases, branches of tall trees rather than leaders were attacked and when the branch was killed, a large canker formed on the trunk surrounding the base of the dead branch.

It would appear that balsam fir dieback becomes of considerable importance under certain environmental conditions. Half of the collections made to date were from trees on open sites and virtually all were from physiologically dry sites. The extremely dry conditions this year would account for the great increase in the number of trees as compared with last year. Trees killed last year were primarily those along roadsides.

In 1954, fruit bodies were rarely found in association with the dead tissue; this year, however, fruit bodies of a fungus belonging to the *Nectria* complex were found in abundance on the majority of affected trees.

Where the roots of trees affected by the balsam fir dieback organism were examined, the majority were found to have mycelial fans of *Armillaria mellea* beneath the bark. Since attack by *Armillaria* occurs under conditions unfavorable to tree growth, it is not surprising that these two organisms are found attacking the same trees.

***Dutch Elm Disease.***—During 1955, as in previous years, identification of all Dutch elm disease material was made by Dr. Ruth Macrae of the Botany and Plant Pathology Division in Ottawa.

The accompanying map shows the total number of collections of Dutch elm disease made in each county since the presence of the Dutch elm disease was first recorded in Ontario in 1946. In 1955, collections were made for the first time in Lambton, Oxford, Norfolk, and Wentworth counties.

A far greater number of diseased trees was reported in the western than in the eastern counties. It is believed that the disease was introduced into Ontario from two different sources. In the east, where few diseased trees have been reported, the only known vector is the native elm bark beetle, *Hylurgopinus rufipes* Eich. In the west, however, where more cases of Dutch elm disease have been observed, the European elm bark beetle *Scolytus multistriatus* (Marsh.), is also known to be present. A similar situation has been reported from the United States.

Of the 64 cases of Dutch elm disease reported during 1955, 14 were from Hamilton where the disease had not previously been reported. It is significant that the European elm bark beetle was found in this vicinity on both diseased and healthy trees.

***Armillaria Root Rot.***—The 136 collections made this year and the 35 made previously indicate that *Armillaria mellea* (Vahl ex Fries) Quel., the cause of Armillaria root rot, occurs throughout the forested area of Ontario. It has been found attacking 21 species including both deciduous and coniferous trees.

Diameters of affected trees range up to 28 inches but a high percentage of the collections was from small trees.

Examination of the dead seedlings in 2-year-old plantations in the Ottawa Valley showed that *A. mellea* was present on 61 of the 177 seedlings examined. The percentage of red pine so affected was much higher than that of white pine or white spruce, but no significant difference could be found among the percentage of seedlings affected on the three different sites examined.

In the Kirkwood Forest Management Unit, *A. mellea* has contributed to the deterioration of young red pine replacements.

In areas surrounding Calm and Banning lakes in the Fort Frances District heavy localized mortality occurred in stands of poplar trees 3 to 4 inches in diameter. Examination of representative trees in a number of locations showed in all cases the presence of fans of *A. mellea*. Small patches of poplar throughout the area were completely dead and approximately 25 per cent of the trees in the remainder of these areas had also been killed. The soil in the affected areas was a shallow, sandy loam, interspersed with rock outcrop.

In the North Bay District 103 trembling aspen averaging 4 inches D.B.H. on a 1-square-chain plot were examined. Of 42 trees dead in this area 35 had been attacked by *A. mellea*.

In the eastern part of the Fort Frances District, especially in the vicinity of MacKenzie and Kawnipi lakes and to a less extent in Quetico Park, considerable mortality of scattered jack pine occurred. The heaviest mortality was observed on rock ridges, particularly along lake shores. Where trees were accessible for examination, *A. mellea* was found in association with the roots.

***Fomes Root and Butt Rot.***—During the 1955 field season *Fomes annosus* (Fries) Cooke, the cause of Fomes root and butt rot, was collected from two localities in Ontario. These are the first records of the occurrence of this fungus in the Province and both occurrences were noted in plantations. The first record was obtained from cultures of decaying red pine roots collected in the early spring at St. Williams in the Lake Erie District. Later in the season, characteristic fruiting bodies were found at ground level on a number of stumps in the same location. The second record was made in a plantation in the Vivian Forest in the Lake Simcoe District, a distance of more than 150 miles from St. Williams. The two stands affected by *F. annosus* are similar in that each was thinned for the first time approximately 10 years ago.

It is of interest that although *F. annosus* is known to occur in northeastern United States it has not been obtained in cultures derived from the extensive cull study carried on by this Laboratory.

***Coniophora puteana*** (Schum. ex Fries) Karst.—This little-known fungus is of fairly common occurrence in eastern white cedar and has also been identified from white spruce. Since its fruit bodies are rarely found, typical samples of brown cubical rot in white cedar were cultured during the past season. The fungus has been found in association with heart rot of living trees in the Chapleau, Geraldton, North Bay, Parry Sound, Rideau, and Sault Ste. Marie districts.

In Wendover Township, Rideau District, 18 of 30 recently-cut trees showed the typical heart rot. In Walford Township, 60 per cent of the trees in a cedar stand adjacent to the Limerick Forest were similarly affected. Where large roadside trees had been cut back periodically to clear telephone or hydro lines, a high percentage of trees in the 6 to 12 inch diameter class was affected. In a woods operation in Goulbourn Township, however, less than 1 per cent of the trees were affected.

***Fungi Causing Decay of Dead Wood.***—While the Forest Disease Survey is primarily interested in diseases of living trees, limited data have been collected on organisms responsible for the decomposition of dead portions of trees. A knowledge of the host and geographic range of these organisms is of importance in our understanding of decomposition, its influence on fire hazard and the rate at which fire-, flood-, or insect-killed stands deteriorate. Sufficient information on the distribution of the following organisms is now available and no further general collections of these organisms need be made.

*Fomes fomentarius* (L. ex Fries) Kicks, the tinder fungus, is one of the most important deteriorating agents of hardwood forests. It is chiefly responsible for decay of sapwood and heartwood of dead timber, but it occasionally causes heart and sap rot of living trees. A total of 390 collections were made during the period 1951 to 1955 from 207 townships in 21 forest districts. Collections were obtained from alder, largetooth aspen, trembling aspen, beech, white birch, yellow birch, red maple, sugar maple, and balsam poplar.

*Fomes pinicola* (Sw.) Cooke, the red belt fungus, causes a rot of the sapwood of dead trees and of the heartwood of both dead and living trees, and is frequently associated with rapid deterioration of timber killed by windthrow, fire, or insects. The 113 collections of this fungus obtained this year make a total of 243 for the 1951 to 1955 period and were from 105 townships in 21 forest districts. Collections were obtained from trembling aspen, white birch, yellow birch, balsam fir, eastern hemlock, jack pine, red pine, white pine, black spruce, and white spruce.

*Polyporus abietinus* Dicks ex Fries, the purple conk, causes a white pocket rot of dead coniferous sapwood on dead or living trees and is associated with the rapid deterioration of dead timber. The 177 collections of this fungus secured this year make a total of 246 for the 1951 to 1955 period with representatives from 150 townships in all 22 forest districts. Collections were obtained from eastern white cedar, balsam fir, eastern hemlock, larch, jack pine, red pine, Scots pine, white pine, western yellow pine, black spruce, and white spruce.

*Polyporus pargamenus* Fries causes a white pocket rot of hardwoods. The 153 collections of the fungus secured this year make a total of 252 for the 1951 to 1955 period, from 81 townships and all the forest districts. Seventy-two per cent of this year's collections were obtained from trembling aspen. Collections were also obtained from mountain ash, largetooth aspen, beech, white birch, yellow birch, black cherry, choke cherry, pin cherry, sugar maple, red oak, and balsam poplar.

*Lenzites saepiaria* Wulf. ex Fries, the slash conk, causes a brown pocket rot of dead coniferous sapwood and, occasionally, of the outer layers of heartwood. The 88 collections of this fungus made this year make a total of 182 for the 1951 to 1955 period, from 21 forest districts. Collections were obtained from trembling aspen, balsam poplar, balsam fir, eastern hemlock, larch, jack pine, red pine, Scots pine, white pine, black spruce, and white spruce.

***White Pine Blister Rust.***—During the 1955 field season, 100 collections of white pine blister rust caused by *Cronartium ribicola* Fischer, were made bringing the total for the period 1951 to 1955 to 213. These collections were made in 148 townships representing 18 forest districts. Collections of white pine blister rust have not yet been made in the Cochrane, Gogama, Kapuskasing, and White River districts, where white pine is a minor species. Of the 207 collections for which the exposure classification is recorded, 96 trees were open grown, 82 partially shaded, and 29 shaded. Seventy-six per cent of the collections were made from trees 5 inches or less D.B.H. and 17·6 per cent from trees 1 inch or less D.B.H.

In the Lindsay District, where white pine is a commercially important species, 100 trees under 50 feet in height were examined at each of 14 check points, distributed among 9 townships. Of these trees, 16 per cent were infected by *C. ribicola*. In the Parry Sound District, 24 per cent of the trees examined in four plots were infected and 19 per cent in two plots in the Lake Huron District. In a 2-square-chain plot in the Pembroke District, 20 per cent of the trees had been killed by white pine blister rust and an additional 13·6 per cent of the trees were infected.

***Sweetfern Blister Rust.***—Seventeen collections of *Cronartium comptoniae* Arth. were obtained from jack pine in the Chapleau, Cochrane, Kenora, Sudbury, and Swastika districts, and one from Corsican pine at Maple in the Lake Simcoe District. Examination of jack pine on a 1-square-chain plot on a sandy ridge in the Chapleau District showed that of the 98 trees present, from 2 to 9 inches D.B.H., 19 per cent were dead, 35·5 per cent healthy, and 45·5 per cent had basal stem-cankers caused by *C. comptoniae*. These basal stem-cankers were also of common occurrence in some jack pine stands in the Cochrane District.

***Needle Rusts of Pine, Spruce and Balsam fir.***—During 1955, 27 collections of *Coleosporium solidaginis* (Schw.) Thum. were secured from jack and red pine in the Chapleau, Lake Erie, Lake Huron, Lindsay, North Bay, Parry Sound, Port Arthur, Rideau, and Lake Simcoe districts. A survey of red pine plantations in Lake Huron District showed that the incidence of the disease was higher in the northern counties of Grey, Bruce, and Wellington than in the remainder of the district. Although conspicuous in the spring, the permanent effect of the disease on the trees was not pronounced.

Twenty-three collections of *Chrysomyxa ledi* (A. & S.) de Bary on black spruce needles, were made in the Sioux Lookout, Kenora, Fort Frances, Port Arthur, Geraldton, White River, Kapuskasing, Parry Sound, and Pembroke districts.

Twelve collections of *Chrysomyxa ledicola* (Peck) Lagerh. on black, blue and white spruce, were received from the Sioux Lookout, Kenora, Fort Frances, Port Arthur, Geraldton, and Kapuskasing districts. All the trees in an open-grown stand of immature black spruce in Township 82 of Geraldton District were severely attacked.

Twenty collections of *Pucciniastrum geoppertianum* (Kuhn) Kleb. on balsam fir, were received from Fort Frances, Port Arthur, Geraldton, White River, Kapuskasing, North Bay, Parry Sound, and Lindsay districts.

As a result of the unusually dry weather at the time of needle infection, the incidence of needle rusts in general was appreciably lower in 1955 than 1954. Exceptions to this were observed on wet sites in the Fort Frances and Geraldton districts, where precipitation in May or June was above normal.

***White Pine Needle Blight.***—Only 59 collections of white pine needle blight were received in 1955; 30 from 24 townships in the Parry Sound District. Since the Survey started in 1951, 143 collections have been made in 100 townships from 13 forest districts. Collections have not been received from northern districts where white pine is a minor species.

At the Petawawa Forest Experiment Station, the downward trend in the incidence of needle blight continued and reached the lowest level on record. Of the 6,500 trees examined approximately 4 per cent were blighted. The same downward trend was reported from the Sault Ste. Marie District, whereas an increase was reported from the Lake Huron, Lindsay, Parry Sound, and Lake Simcoe districts. Symptoms appeared very quickly in the Lake Simcoe District

during the extremely hot days of early July. In parts of Oro and Rama Townships, Lake Simcoe District, 30 and 50 per cent respectively, of the white pines were affected. All trees up to 20 feet in height were affected in portions of Orillia Township. In the Parry Sound District, the examination of groups of 100 trees in 7 plantations showed that from 5 to 30 per cent of the trees were affected by needle blight. In the Lindsay District, groups of trees in eight townships showed that from 5 to 24 per cent of the trees were affected.

At Mattawa in the North Bay District, an average of 1·9 per cent of the white pine on ten permanent sample plots was affected in 1954, whereas the average was 6 per cent for 1955.

***Shoot Blight of Aspen.***—During the 1955 field season, 121 collections of *Fusicladium radiosum* (Lib.) Lind. were made in Ontario. *F. radiosum* attacks balsam poplar and largetooth aspen but is primarily found on trembling aspen. To date, collections have been made in all the forest districts except Rideau and Lake Simcoe. The majority of collections have been made on trees 1 inch or less in diameter but, in rare cases, the tips of lower branches on trees up to 6 inches D.B.H. have been found infected.

Reports indicate that the incidence of the disease in 1955 was above normal in the western districts of Sioux Lookout, Kenora, and Fort Frances. Symptom expression was most pronounced during the months of June, July, and August. In most of the areas examined in the Kenora District, all aspens up to 5 or 6 feet in height were severely attacked. In the southeastern portion of the Province, however, the incidence of aspen shoot blight was unusually low.

It is of interest that, in general, precipitation for the month of May, when initial infection occurs, was below normal in the southeast and well above normal in the northwest.

***Damping-off.***—Through the co-operation of the superintendents of provincial and industrial nurseries, collections were obtained of damped-off seedlings during the first 3 weeks after germination. Cultures from these seedlings have yet to be examined to determine whether the same or different fungi were responsible for damping-off in widely separated nurseries, such as those at St. Williams and Kapuskasing. These cultures will also indicate whether or not organisms show a preference for given host species. In general, the estimated losses for 1955 were below those for 1954. It has been suggested that this difference can be largely attributed to early germination caused by unusually high spring temperatures. Losses at Midhurst, however, were an exception. The average loss of red pine seedlings for four beds of red pine was 50·3 per cent. Species most commonly affected by damping-off in Ontario were white spruce, red pine, and white pine.

***Eastern Dwarf Mistletoe.***—Eastern dwarf mistletoe (*Arceuthobium pusillum*) Peck has been found attacking black spruce in the Sioux Lookout, Kenora, Port Arthur, Geraldton, Kapuskasing, Sault Ste. Marie, Lake Simcoe, and Lake Huron District. It is most commonly found in the northwestern districts on wet sites and in relatively open stands.

In severe cases infection resulted in distortion of the main stems and finally in the death of the trees. All trees examined in an area around Kirkness Lake in the Sioux Lookout District were attacked. In the Kenora District, a high percentage of trees was attacked at White Otter and Norway lakes; a similar

condition existed in Bridges and Smellie townships and in the spruce swamps between Kenora and Longbow Corners. In the Port Arthur District, mistletoe was commonly found on black spruce in Joynt and Savanne townships.

***A Deterioration of Birch.***—In the Sioux Lookout, Port Arthur, Geraldton, White River, Chapleau, Gogama, and Lake Huron districts a deterioration of white birch was characterized by the dieback of branch tips and, occasionally of complete crowns. The symptoms were observed most commonly on trees along roadsides and in partially thinned stands. While this condition was primarily noted on mature white birch, it was also found on trees as small as 4 inches D.B.H. Approximately 75 per cent of the remaining birch trees were affected to a greater or lesser extent in a stand in Geraldton District, where the conifers had been cut leaving a few scattered white birch.

In previous years reports of deterioration of white and yellow birch were received from the Sault Ste. Marie, North Bay, Parry Sound, Lake Simcoe, and Lake Erie districts. During the 1955 field season a reassessment was made of the condition of all hardwoods occurring in 21 sample plots established throughout the range of yellow birch in Ontario. Although the deterioration of yellow birch was less noticeable during the period 1951 to 1953, it became more apparent during the period 1953 to 1955. In 1955, a further slight decline in the condition of yellow birch was observed.

***Herbicide Injury.***—In the 1954 report, malformation of the foliage of Manitoba maple was attributed to the fumes from 2, 4-D acting on leaves in the early stages of development. This year similar symptoms have been observed on alder, mountain ash, trembling aspen, white birch, eastern choke cherry, white elm, hazel, red oak and red maple. Collections were received from the Cochrane, Lindsay, Parry Sound, Pembroke, Rideau, and Tweed districts. Leaves were curled due to uneven growth and, in severe cases the leaf surface was chlorotic and reduced in width. Two extremes of development of mountain ash leaves were found; some leaves were little more than a system of veins, whereas, others showed a hypertrophic development in which the leaflets were joined to form a simple leaf. Collections of these malformed leaves were made where spray operations had been carried on but where there was no direct application of spray to the leaves. Leaf distortion was not systemic, but occurred only among those leaves that were passing through an early stage of development when the spray was applied.

***Sulphur Fume Injury.***—The office of the Sulphur Fumes Arbitrator, Sudbury, reported that there were seven automatic sulphur-dioxide recorders in operation during 1955 at the same locations as in 1954, namely, Garson, Skead, Goulard's Mill, Grassy Lake, Lake Penage, Nickel Offsets, and Burwash. Considerably more fumes were recorded in a northeast direction from Copper Cliff this year than last year, due to a greater frequency of southwest winds, especially in July. The maximum half-hour average reading was obtained at Skead (3·06 parts per million) on May 22.

In addition to the above recorders, a portable sulphur-dioxide autometer was in operation in areas within a 10-mile radius of Sudbury. The object of this work was to determine what maximum concentrations could be recorded in areas adjacent to Sudbury. The recorder was placed in the smoke stream reaching the ground and was removed to a new location when the smoke shifted. Thus, it was possible to obtain readings in the densest part of the smoke.

Approximately 300 samples of air were taken; the majority contained between 0·25 and 0·50 parts per million. The maximum concentration (1·81 parts per million) was obtained in Broder Township, approximately 6 miles southeast of Copper Cliff.

From these data, and from previous records, the zone of maximum concentration and duration is somewhere between Garson and Skead in a northeasterly direction from Copper Cliff. This is probably due to the cumulative effect of the three smelters in the Sudbury area, i.e. Copper Cliff, Coniston, and Falconbridge.

Although more fumes were recorded during 1955 than in the previous season there was less actual burning of vegetation. This is probably due to the hot dry weather, which prevailed throughout most of the spring and summer. The wet spring and fall of 1954 produced succulent vegetation that is susceptible to injury. The farthest point from the smelters at which injury was observed in 1955 was in Scadding Township, approximately 30 miles northeast of Copper Cliff.

***Salt Injury.***—Where plantings of conifers are close enough to roadways to be reached by the spray of passing vehicles, needles on lower branches are frequently burned and killed. The burning results from the salt used in the winter months. According to observations made in the Rideau, Tweed, and Sault Ste. Marie districts, red pine, Scots pine, balsam fir, white spruce, and eastern white cedar were affected to a greater extent than other species. Trees on outside curves were affected most seriously, especially where the trees were on a level lower than the roadway. In several cases the injury resulted in the death of trees.

***Windthrow.***—A wind storm in August caused severe blowdown in the area north of Atikokan in the Fort Frances District. Some red and white pines in the area were affected, as well as large numbers of black spruce and overmature poplar. In the Sioux Lookout District, a large area of blowdown occurred south of Goose Lake and east of Nungesser Lake. In August 1955, a severe windstorm destroyed several acres of mature trembling aspen and white birch on the western boundary of the Gogama District.

***Hail Injury.***—Severe injury of balsam fir regeneration, resulting from a hail storm in 1954 was observed in Division 37 of the Port Arthur District. An area of approximately 32 square miles extending westward from Frazer Lake in a strip 4 miles wide was most severely affected. Damage in this area resulted in the death of approximately 50 per cent of the branches of balsam fir. Injury to hardwoods in the same area was not severe enough to cause the death of branches.

An area south of Dyment in the Kenora District, approximately 12 square miles in extent, was damaged by a hail storm in July 1954. Numerous branches of all species of trees were killed and there was some mortality of balsam fir.

An estimated area of 300 square miles, extending southeast from Separation Lake in the Kenora District, was damaged by a hail storm in August, 1955.

Extensive damage to white pine regeneration was observed in McKay Township, Pembroke District.

## OTHER NOTEWORTHY DISEASES

| Host | Organism | Locality | Remarks |
|---|---|---|---|
| Trembling aspen... | *Nectria galligena* Bres.... | Geraldton, Kapuskasing, Sault Ste. Marie, Parry Sound, Pembroke, Lindsay & Lake Simcoe districts. | 17·3 per cent of aspen on a sq.-ch. plot infected in Kapuskasing. |
| | *Sclerotinia whetzelii* Seaver. | Kenora & Fort Frances districts. | Severe at Quibell Lake, Kenora District. Generally more common in the northwestern districts where spring rainfall was above average. |
| Butternut..... | *Melanconis juglandis* (E. & E.) Graves. | Mountain Grove, Tweed District; Lake Simcoe District. | First report for the survey. |
| White elm..... | *Dothiorella ulmi* Verrall & May. | Lake Erie, Lake Huron, Lake Simcoe, Rideau, & North Bay districts. | Readily confused with Dutch elm disease; distinguishable only in culture. |
| Balsam fir..... | *Nectria cucurbitula* (Tode) Fr. | Throughout the range of balsam fir. | First time recorded in the survey. Also on jack pine, white pine. |
| Jack pine..... | *Arceuthobium americanum* Nutt. | White Otter Lake, Kenora District. | First known record for Ontario. |
| Black spruce..... | *Cytospora kunzei* Sacc..... | Eva Lake, Fort Frances. | Found previously on blue spruce. This is the first record on black spruce noted in the survey. |
| Willow..... | *Fusicladium saliciperdum* (All. & Tub) Lind. | Broder Twp., Sudbury District. | Jointly causing willow blight. First reported from Markham, Ont., 1948. Wide distribution of these organisms not previously recognized. |
| | *Physalospora miyabeana* Fuk. | Kenora, Sault Ste. Marie, Lake Simcoe, & Lindsay districts. | |

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Henry, E.
Herbert, Mrs. R.
Hetherington, F. E.
Holman, G.
Howard, C. P.
Hughes, E.

Jackson, J. C.
Jackson, M.
Jervis, Mr.
Jones, A. R. C.

Kasari, V.
King, B.
Kirby, C.
Kirk, M. D.
Kneale, A.

Lane, C. H.
Lea, J.
Leaver, Mrs. D.
Leman, A. W.
Leslie, A. P.
Leuty, C. R.
Love, B.

MacEachern, G. A.
Macpherson, Mrs. D. S.
Marlow, J. A.
Martin, Mrs. E. F.
McCormick, T.
McDonald, Mrs. D.
McGown, T. N.
McKichan, Mrs. D. B.
McLean, E. L.
McNair, G. A.
Meagher, W. J.
Minegarten, Mrs.
Monro, A.
Montgomery, Mrs.
Moore, W. E.
Muir, Mrs. A. R.
Muma, A. R.
Murphy, J.

Narraway, J. L. A.
Nichols, D.
Ninnes, Mrs. J.
Nobbe, A. W.
Noowell, W.
Norman, R. E.

Oliver, J. H.
Orser, Mrs. E.

Peacock, A. H.
Pearce, W. M.
Pearson, W.
Pelton, R. R.
Phillips, E.
Pletsch, P. E.

Racey, A. G.
Robertson, Mrs. W. M.
Rojo, Mrs. R.
Rutherford, Miss W. D.

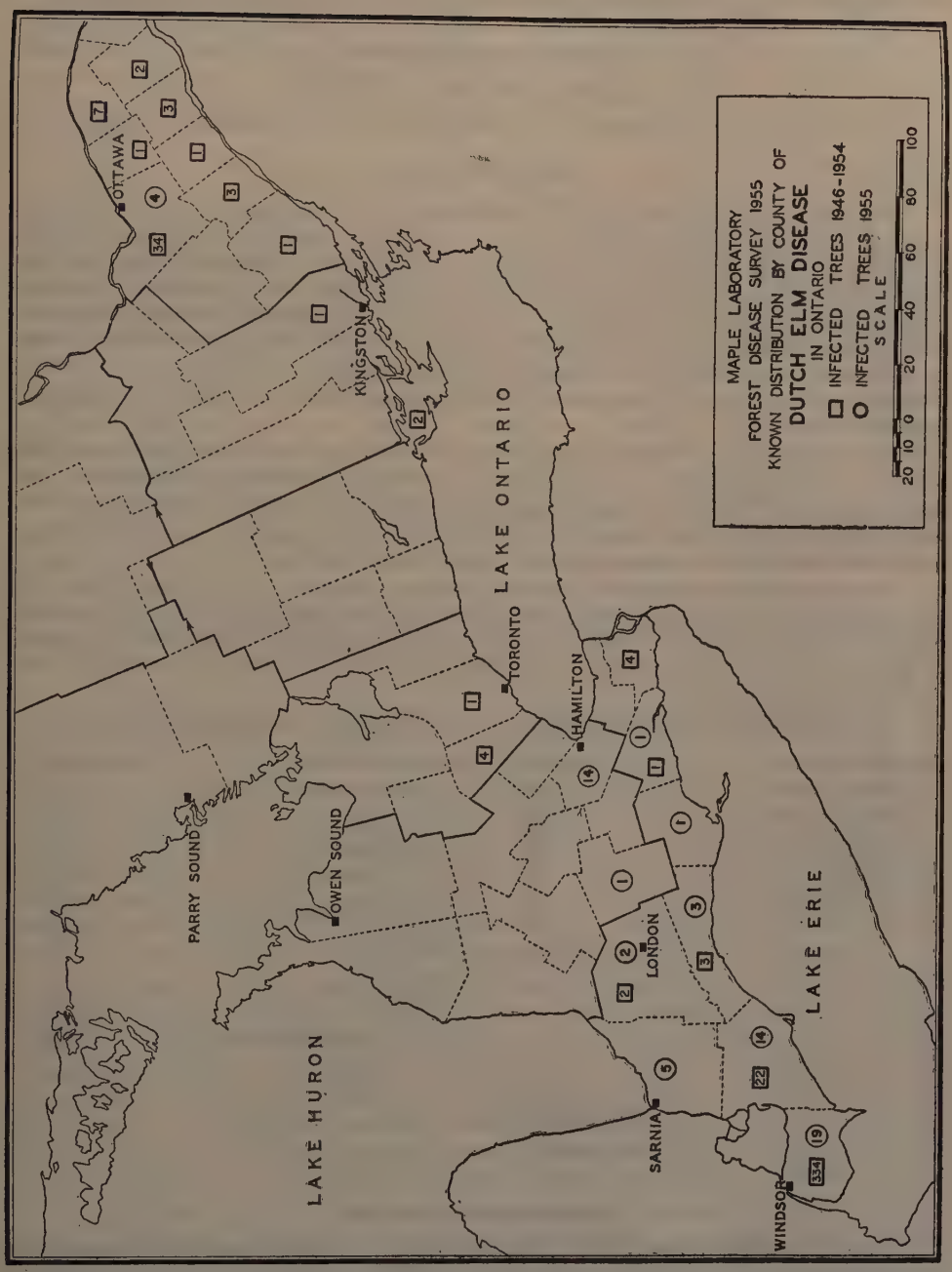
Scatterly, J. M.
Schaeffer, Mr.
Scott, D. A.
Shalla, J.
Shaw, W. R.
Silzer, Mrs. V. J.
Sitton, Miss G. I.
Smith, S.
Snow, R. L.
Spears, W. B.
Steele, W. E.
Stessler, F.
Strathdee, D.

Taylor, Mrs. R. J.
Thornton, D. D.
Tilson, G. E.
Tremblay, F.

Walroth, A. E.
Warriner, Mrs. L.
Watson, J.
Weegar, C.
Wright, Mrs. A.

Young, G. W.

Zavitz, C. H.


MAPLE LABORATORY
FOREST DISEASE SURVEY 1955
KNOWN DISTRIBUTION BY COUNTY OF
DUTCH ELM DISEASE
IN ONTARIO
INFECTED TREES 1946-1954
INFECTED TREES 1955
SCALE
20 10 0 20 40 60 80 100
LAKE ONTARIO
LAKE ERIE
LAKE HURON
OTTAWA
KINGSTON
TORONTO
HAMILTON
LONDON
SARNIA
WINDSOR
PARRY SOUND
OWEN SOUND

# PROVINCES OF MANITOBA AND SASKATCHEWAN

## FOREST INSECT SURVEY

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### INTRODUCTION

The most notable changes in the status of forest insects in the forested areas of Manitoba and Saskatchewan were a general decline of the larch sawfly outbreak, an increase in the distribution of the spruce budworm, and the first record of the pine root-collar weevil. Also noted in 1955 was a complex of species attacking the heavily-coned tops of black spruce throughout northern Manitoba and Saskatchewan. The principal defoliators of shelterbelt and parkland trees in the south were the yellow-headed spruce sawfly and the fall cankerworm. The latter, however, declined considerably in numbers, particularly in southern Saskatchewan.

The discovery of the pine root-collar weevil shows the need for intensifying surveys of plantations. Recently, two introduced pests, the European pine shoot moth and the larch case bearer were recorded in the United States near southeastern Manitoba. Surveys will be intensified in this area in 1956 to detect the possible occurrence of such introduced species.

The number of samples received at the laboratory totalled 3,704. Of these, 3,330 were submitted by Forest Biology personnel and 374 by provincial and other co-operators. In addition to reporting on insect conditions, personnel of the Provincial forest services assisted by providing services essential to the operation of the Survey.

The number of collections from the principal host trees were as follows:

| Coniferous trees | Collections | Broad-leaved trees | Collections |
|---|---|---|---|
| White spruce | 586 | Trembling aspen | 657 |
| Jack pine | 509 | Willow | 325 |
| Tamarack | 376 | White birch | 203 |
| Black spruce | 302 | Balsam poplar | 132 |
| Balsam fir | 82 | Choke cherry | 110 |
| Colorado spruce | 11 | Alder | 81 |
| Other coniferous trees | 42 | Manitoba maple | 78 |
| | | Bur oak | 31 |
| Total | 1,908 | White elm | 17 |
| | | Green ash | 14 |
| | | Dogwood | 12 |
| | | Caragana | 10 |
| | | Other broad-leaved trees | 106 |
| | | Total | 1,776 |

Miscellaneous hosts ..... 20

Grand Total ..... 3,704

### IMPORTANT INSECTS

***Larch sawfly,*** *Pristiphora erichsonii* (Htg.).—Most tamarack stands were again infested by the larch sawfly, but population levels in many areas continued to decline for the second year. The most severe and extensive infestation in 1955 was found in the Churchill River basin of northern Saskatchewan.

Defoliation of tamarack was generally light in the Eastern and Southern districts of Manitoba. Individual stands in the Whiteshell Forest Reserve and in the Piney-South Junction areas were moderately attacked. Some stand deterioration was evident in parts of the Whiteshell Forest Reserve, where severe defoliation occurred from 1949 to 1953. Preliminary analyses of retallies of permanent sample plots in this area indicated up to 30 per cent mortality of tamarack primarily attributable to the larch sawfly attack. Surviving trees in these plots showed signs of recovery in 1955 in the form of increased foliage production.

Defoliation was light throughout most of the Western and Northern districts of Manitoba. Tamarack growing in bogs near the Norgate and Lake Audy areas in Riding Mountain National Park were moderately defoliated.

Larch sawfly infestations in the Hudson Bay District of Saskatchewan almost completely subsided, and it was difficult to find larvæ throughout most of this District. Tamarack plantations at Wolsley and Indian Head in the agricultural region of Saskatchewan were again lightly to moderately defoliated.

A marked decline in defoliation was evident in the Nisbet Provincial Forest in the Prince Albert District. Tallies of permanent plots in this area also indicated delayed tree and branch mortality. Stands in the Big River and Meadow Lake provincial forests, which suffered complete defoliation in 1954, were only lightly attacked.

An extensive and severe infestation was centered in the Churchill River basin of northern Saskatchewan. Aerial surveys showed that severe defoliation extended as far north as Wollaston Lake, which approaches the northern range of tamarack.

Defoliation of tamarack at various points in Manitoba and Saskatchewan is shown on the accompanying map.

Although population trends of the larch sawfly varied between stands, a general decline in the severity of attack has been evident in recent years. In the older infestations of Manitoba and central and eastern Saskatchewan, the reduction in numbers is mainly attributed to sparse foliage production following five or six years of severe defoliation. Foliage production has been too light to support high sawfly populations. Biotic factors such as parasites, predators, and disease may have contributed to the decline of the infestations. However, records indicate that some of these factors, particularly the parasite *Bessa harveyi* Tnsd., are major control agents only at a low host density. Perhaps the population levels in the older infestations of Manitoba and Saskatchewan have now reached a level at which these controls can be effective.

The decline of the most recent infestations in northern and western Saskatchewan is attributed mainly to the high water levels during the period of larval drop in 1954 and of adult emergence in 1955. High mortality from larvæ dropping into open water was observed in both districts. It is significant that the severity of these infestations declined after only one or two years of severe defoliation. The infested trees show little if any loss in shoot and foliage production. During 1955, water levels were not so high and favored sawfly survival. Extensive vigorous stands capable of again supporting high populations remain.

Despite the gradual decline of the larch sawfly infestation in some areas, there is evidence of delayed tree and branch mortality. A preliminary analysis of retallies from 60 permanent sample plots shows that the mortality was generally negligible to light in most districts, but as high as 30 per cent in exceptional cases. However, a more critical examination of the plots and review of the defoliation history is necessary to determine if mortality is primarily due to larch sawfly defoliation, flooding or other physical factors.

The following table shows the occurrence of larch sawfly larvæ in collections from tamarack during the period of larval activity:

| District | Collections from tamarack | Percentage containing larch sawfly |
|---|---|---|
| *Manitoba* | | |
| Eastern | 33 | 84·8 |
| Southern | 26 | 100·0 |
| Northern | 51 | 78·4 |
| Western | 51 | 63·9 |
| *Saskatchewan* | | |
| Southern | 3 | 33·3 |
| Hudson Bay | 73 | 83·6 |
| Prince Albert | 56 | 78·5 |
| Meadow Lake | 33 | 78·8 |
| Northern | 52 | 65·4 |

| | Collections |
|---|---|
| Manitoba | 130 |
| Saskatchewan | 166 |

***Spruce Budworm,*** *Choristoneura fumiferana* (Clem.).—A general increase in populations of spruce budworm occurred throughout most of Manitoba. Defoliation of white spruce and balsam fir at sampling points is shown on the accompanying map.

A small infestation persisted near the northeast tip of Namew Lake on the Manitoba-Saskatchewan border. Moderate to severe defoliation of white spruce and balsam fir was common over an area of approximately 25 square miles. Larval sampling showed a considerable increase in budworm numbers in areas adjacent to the outbreak. Light defoliation was also common in the The Pas area northeast of Namew Lake, and in the Creighton area to the northwest. These extensions of the original outbreak occurred in stands of high black spruce content. Therefore, it is unlikely that severe damage will result.

The insect was common in the Western District of Manitoba. White spruce was very lightly defoliated near Riding Mountain National Park. Scattered stands north of Camperville were moderately attacked.

A striking change was noted in the status of the spruce budworm in the Eastern District of Manitoba. Moderate to severe defoliation of white spruce and balsam fir occurred along the west shore of Lake Winnipeg from Gimli north to Washow Bay. Severe defoliation was reported east of Lake Winnipeg to the Manitoba-Ontario border, especially near Sasaginigak, Moor, Dogskin, Horseshoe, Wallace, and Round lakes. At Wallace Lake, severe defoliation for the past two years has caused some mortality of white spruce and balsam fir reproduction. The infestation in eastern Manitoba is an extension from northwestern Ontario.

In the Southern District of Manitoba, defoliation of white spruce was light throughout the Sandilands Forest Reserve and the Spruce Woods Forest Reserve.

The budworm was collected from a number of widely scattered points in the Hudson Bay District and shelterbelt region of Saskatchewan. Defoliation at these points was negligible.

The following table shows the occurrence of spruce budworm larvæ in collections from spruce and balsam fir during the period of larval activity.

| District | Collections from spruce and balsam fir | Percentage containing spruce budworm |
|---|---|---|
| *Manitoba* | | |
| Southern | 73 | 68·5 |
| Eastern | 105 | 95·2 |
| Northern | 140 | 30·7 |
| Western | 178 | 18·0 |
| *Saskatchewan* | | |
| Southern | 54 | 7·4 |
| Hudson Bay | 117 | 5·1 |
| Prince Albert | 107 | 2·8 |
| Meadow Lake | 67 | 0·0 |
| Northern | 134 | 0·74 |

| | Collections |
|---|---|
| Manitoba | 225 |
| Saskatchewan | 14 |

***Jack-pine Budworm,*** *Choristoneura pinus* Free.—For the second year an increase in distribution and abundance of the jack-pine budworm was recorded in southeastern Manitoba. The Stead and Belair infestations showed defoliation ranging from light to severe. In general there was a marked reduction in stands that had been severely defoliated the past two years. This reduction was correlated with the absence of staminate flowers and poor foliage production. In peripheral areas, where flower and foliage production was heavy, budworm population levels increased in 1955.

Infestations again occurred at widely separated points in the Sandilands Forest Reserve. Those reported in the northern and southern parts of the Reserve in 1954, continued in 1955. A new infestation north of Dawson Cabin caused moderate defoliation of current shoots of jack pine over an area of approximately 20 square miles. A severe forest fire through the northern part of the Reserve has destroyed many infested stands.

The budworm was common in the Hudson Bay and Prince Albert districts of Saskatchewan, but feeding was negligible. The following table shows the occurrence of jack-pine budworm larvae in collections from jack pine during the period of larval feeding.

| District | Collections from jack pine | Percentage containing jack-pine budworm |
|---|---|---|
| *Manitoba* | | |
| Southern | 166 | 21·1 |
| Eastern | 127 | 16·5 |
| Northern | 23 | 13·0 |
| Western | 36 | 22·2 |
| *Saskatchewan* | | |
| Hudson Bay | 44 | 31·8 |
| Prince Albert | 80 | 33·7 |
| Meadow Lake | 8 | 0·0 |
| Northern | 26 | 19·2 |

| | Collections |
|---|---|
| Manitoba | 67 |
| Saskatchewan | 46 |

***Yellow-headed Spruce Sawfly,*** *Pikonema alaskensis* (Roh.).—This sawfly was again the major pest of white spruce trees planted for shade or shelterbelt purposes. In the Meadow Lake District of northern Saskatchewan, spruce shelter-belts were severely defoliated near Loon Lake, Pierceland, and Green Lake. In the agricultural areas of southern Saskatchewan, chemical control operations apparently have been effective as a marked decline in numbers was evident in 1955. Larvae were common in the Yorkton and Carlyle areas but feeding was negligible. Shelterbelt and ornamental spruce in the Hudson Bay District were severely attacked. An increase in population level was also recorded in the forested areas of the Duck Mountain and Northern provincial forests.

In Manitoba, moderate defoliation of white spruce was reported in parts of the Riding Mountain National Park.

Although this insect is not considered a serious pest in forest areas, 1955 surveys indicated a general increase in abundance particularly in northern Saskatchewan. Aerial surveys in the Wollaston Lake area showed complete stripping of black spruce foliage on a number of islands at the south end of the lake.

| *Manitoba* | Collections |
|---|---|
| Southern | 10 |
| Eastern | 16 |
| Northern | 29 |
| Western | 47 |
| *Saskatchewan* | |
| Southern | 20 |
| Hudson Bay | 43 |
| Prince Albert | 16 |
| Meadow Lake | 16 |
| Northern | 8 |

***Fall Cankerworm,*** *Alsophila pometaria* (Harr.).—The fall cankerworm again caused severe defoliation of deciduous trees in farm shelterbelts and park areas of southern Manitoba and Saskatchewan.

In the Red River Valley of Manitoba there was a marked decline in numbers of this insect. This decline was offset by increases in the southwestern part of the Province. A striking infestation occurred in the Portage La Prairie area. Elm and Manitoba maple were completely defoliated in Elk Island Park, and within a radius of 10 miles of the townsite. At Souris, Glenbora, Boissevain and a number of other towns in the southwest corner of the Province, larvae were numerous but feeding was less severe.

In Saskatchewan, the status of this species was much the same as in 1954. Shelterbelts in the Moose Jaw area were mostly heavily attacked.

| *Manitoba* | Collections |
|---|---|
| Southern | 12 |
| Eastern | 1 |
| Northern | 1 |
| Western | 2 |
| *Saskatchewan* | |
| Southern | 31 |

***Insects Attacking Black Spruce.***—A complex of insect species was found feeding in the upper crown of close-growing, "club-topped", black spruce in northern Manitoba and Saskatchewan. Trees having an abundance of cones appeared to be most severely attacked and showed conspicuous accumulations of frass and webbing. The variety of species present made it difficult to appraise the damage caused by each. Damage included boring in cones, needle mining,

and defoliation. Frequently large numbers of as many as six species were found in heavily-coned tops. In order of relative abundance the species were, *Herculia thymetusalis* Wlk., *Archips alberta* McD., *Epizeuxis aemula* Hbn., *Dioryctria abietella* (D. & S.), *Acleris variana* (Fern.), and two additional tortricid species and one gelechiid species, as yet not identified. Numerous hymenopterous and dipterous pupae were also present within the frass and webbing.

Aerial surveys showed that the browning of black spruce tops, indicating the above condition, was present over a wide area extending north of the range of ground and aerial surveys.

***Black-headed Budworm,*** *Acleris variana* (Fern.).—Although generally found in association with other species, moderate defoliation of black spruce in northern Manitoba and Saskatchewan was attributed solely to this species. Feeding was most conspicuous in the upper portion of heavily-coned trees. Approximately 75 per cent of all black spruce samples received from the Northern District of Manitoba contained black-headed budworm larvae.

| | Collections |
|---|---|
| *Manitoba* | |
| Southern | 16 |
| Eastern | 16 |
| Northern | 70 |
| Western | 41 |
| *Saskatchewan* | |
| Southern | 9 |
| Hudson Bay | 53 |
| Prince Albert | 40 |
| Meadow Lake | 6 |
| Northern | 61 |

***Pine Root-collar Weevil,*** *Hylobius radicis* Buch.—An outbreak of the pine root-collar weevil was discovered in the Sandilands Forest Reserve, Manitoba, in the spring of 1955. Although previously unrecorded in Manitoba, the severity of attack indicated that this weevil has been present for at least two years. Scots and lodgepole pine, ranging in age from 7 to 18 years, were severely attacked over an area of approximately 100 acres. Tallies showed that up to 25 per cent of the trees were dead and many others showed recent attack. Some larvae were found feeding on the root collars of red pine trees but damage was negligible.

Surveys were conducted in the extensive pine plantations of the Spruce Woods Forest Reserve, but no weevils were found in this area. These plantations are approximately 200 miles west of the outbreak in southeastern Manitoba.

***Forest Tent Caterpillar,*** *Malacosoma disstria* Hbn.—Collections of the forest tent caterpillar were received from all forest districts except the Meadow Lake District of Saskatchewan, but population levels remained very low. Occassional clusters of larvae were observed along the Armit Road in the Hudson Bay District, but no appreciable defoliation occurred.

| | Collections |
|---|---|
| *Manitoba* | |
| Southern | 6 |
| Eastern | 2 |
| Northern | 3 |
| Western | 4 |
| *Saskatchewan* | |
| Southern | 2 |
| Hudson Bay | 3 |
| Prince Albert | 1 |
| Northern | 1 |

***Large Aspen Tortrix,*** *Choristoneura conflictana* (Wlkr.).—Populations of this species on trembling aspen remained at endemic levels throughout most of the region. The pyralids, *Tetralopha asperatella* (Clem.) and *Meroptera pravella* (Grt.) were usually found in association with this insect.

The following table shows the occurrence of aspen tortrix larvae in collections from poplar during the period of larval activity.

| District | Collections from poplar | Percentage containing large aspen tortrix |
|---|---|---|
| *Manitoba* | | |
| Southern | 54 | 0·0 |
| Eastern | 73 | 1·4 |
| Northern | 70 | 10·0 |
| Western | 84 | 14·3 |
| *Saskatchewan* | | |
| Southern | 88 | 15·9 |
| Hudson Bay | 179 | 19·5 |
| Prince Albert | 99 | 42·4 |
| Meadow Lake | 105 | 50·5 |
| Northern | 59 | 23·7 |

| | Collections |
|---|---|
| Manitoba | 20 |
| Saskatchewan | 158 |

***Aspen Blotch Miner,*** *Lithocolletis salicifoliella* Chamb.—Populations of this leaf miner showed a further decline in both provinces. No conspicuous browning of trembling aspen foliage was reported in 1955.

| *Manitoba* | Collections |
|---|---|
| Southern | 5 |
| Eastern | 8 |
| Northern | 4 |
| Western | 7 |
| *Saskatchewan* | |
| Southern | 2 |
| Hudson Bay | 3 |
| Prince Albert | 4 |
| Northern | 8 |

***Gray Willow-Leaf Beetle,*** *Galerucella decora* (Say).—This leaf beetle was again common on willow. Severe skeletonizing of foliage was reported from north of Reserve in the Hudson Bay District and the Moose Mountain Provincial Forest in Saskatchewan.

| *Manitoba* | Collections |
|---|---|
| Southern | 6 |
| Eastern | 11 |
| Northern | 34 |
| Western | 16 |
| *Saskatchewan* | |
| Southern | 16 |
| Hudson Bay | 37 |
| Prince Albert | 26 |
| Meadow Lake | 7 |
| Northern | 13 |

***Pine Tortoise Scale,*** *Toumeyella numismaticum* (P. & M.).—A slight increase in the numbers of this scale was recorded in the Southern District of Manitoba.

Elsewhere there was no appreciable change in the status of this insect.

| *Manitoba* | Collections |
|---|---|
| Southern | 20 |
| Eastern | 11 |
| Western | 2 |
| *Saskatchewan* | |
| Prince Albert | 14 |

***Spruce Spider Mite,*** *Paratetranychus ununguis* (Jac.).—The spruce spider mite caused moderate damage to ornamental spruce near Rosetown. Elsewhere in the agricultural area of Saskatchewan damage was light.

| *Saskatchewan* | Collections |
|---|---|
| Southern | 9 |

***Boxelder Leaf Roller,*** *Gracillaria* prob. *negundella* Chamb.—Defoliation by the boxelder leaf roller in the agricultural areas was somewhat lighter than in 1954. A moderate infestation was reported near Moose Jaw, Sask.

| *Manitoba* | Collections |
|---|---|
| Eastern | 1 |
| *Saskatchewan* | |
| Southern | 7 |
| Hudson Bay | 2 |

***Pine Webworm,*** *Tetralopha robustella* Zell.—The heavily-coned tops of jack pine trees in the southern portion of Sandilands Forest Reserve were severely infested with this webworm in 1955.

| *Manitoba* | Collections |
|---|---|
| Southern | 32 |
| Eastern | 11 |
| *Saskatchewan* | |
| Northern | 1 |

***Pitch Nodule Maker,*** *Petrova albicapitana* (Busck.).—A 40-acre plantation of jack pine in the Nisbet Provincial Forest, Saskatchewan, was severely attacked by this insect in 1955. Representative counts showed from 6 to 10 nodules per tree. The breaking of infested leaders was common.

| *Manitoba* | Collections |
|---|---|
| Southern | 28 |
| Eastern | 22 |
| Northern | 1 |
| Western | 1 |
| *Saskatchewan* | |
| Hudson Bay | 15 |
| Prince Albert | 45 |
| Northern | 9 |

***Birch-leaf Skeletonizer,*** *Bucculatrix canadensisella* Chamb.—Light populations of this insect were present in all forest districts. Light to moderate browning of birch foliage was found in the Bear River, and Lac du Bonnet areas of the Eastern District of Manitoba. The browning was caused by the combined effect of the skeletonizer and severe drought conditions.

| *Manitoba* | Collections |
|---|---|
| Southern | 17 |
| Eastern | 15 |
| Northern | 5 |
| Western | 18 |
| *Saskatchewan* | |
| Southern | 3 |
| Hudson Bay | 1 |
| Prince Albert | 7 |
| Meadow Lake | 6 |
| Northern | 6 |

***Balsam fir Sawfly,*** *Neodiprion abietis* (Harr.).—This sawfly was common on white and black spruce in the Riding Mountain National Park, but defoliation was generally light.

| *Manitoba* | Collections |
|---|---|
| Eastern | 4 |
| Northern | 2 |
| Western | 23 |
| *Saskatchewan* | |
| Hudson Bay | 6 |
| Prince Albert | 3 |
| Northern | 1 |

***Green-headed Spruce Sawfly,*** *Pikonema dimmockii* (Roh.).—This sawfly was found together with the yellow-headed spruce sawfly but at low population levels.

| *Manitoba* | Collections |
|---|---|
| Southern | 10 |
| Eastern | 8 |
| Northern | 30 |
| Western | 44 |
| *Saskatchewan* | |
| Southern | 3 |
| Hudson Bay | 26 |
| Prince Albert | 6 |
| Northern | 4 |

## LIST OF CO-OPERATORS

Aikinhead, Rev.
Allen, D. C. M.
Arnold, F.

Bacon, J.
Balfour, P.
Barton, H.
Beaudoin, F.
Binkley, D. B.
Black, H. W.
Blackburn, I. J.
Boreham, H. B.
Burant, D. G.
Burke-Gaffney, T.

Campbell, B. H.
Caskey, R. D.
Cayford, J. H.
Chester, S.
Cloutier, J.
Conrad, Mrs.
Cooper, D. E.
Cooper, R.
Craig, T.
Cram, W. H.
Crawford, K. B.

Dallman, F.
Danilkevick, N.

Doan, A. C.
Doun, J.
Drouin, Mrs. J. A.

Erlendson, W.
Evans, G. J.

Farr, F. T.
Fenner, F.
Ferguson, C.
Friedoff, J. E.

Gaunthier, A.
Gilmore, R.

## LIST OF CO-OPERATORS—Concluded

Gossen, H.

Hill, D.
Hill, R.
Hill, Mrs. R.
Hislop, W. L.
Horncastle, D. A.
Horne, L. S.

Jardine, A.
Jellico, D.
Johnson, A.

Kirk, A. A.
Klavins, A.
Kotowycz, A. J.
Kunkel, J. W.

Lalor, Mrs. P.
Langford, J.
Laroque, O.
Laroque, P.
Leia, T.
Leitkie, C. E.
Lowenberg, D.

Maltman, S.
MacKenzie, R. C.
MacNeill, W.
Majure, M. T.
Marcotte, Mrs. M.
McCaw, Mrs. C.
McLeod, Miss M.
McNeill, Miss E.
Medland, C. R.
Mesiman, W. T.
Millar, M.
Millard, E. L.

Norman, J. B.

Ontkean, G.

Pederson, G. J.
Perchuk, P.
Pliska, A.
Pocha, R.
Potter, Mrs. J.

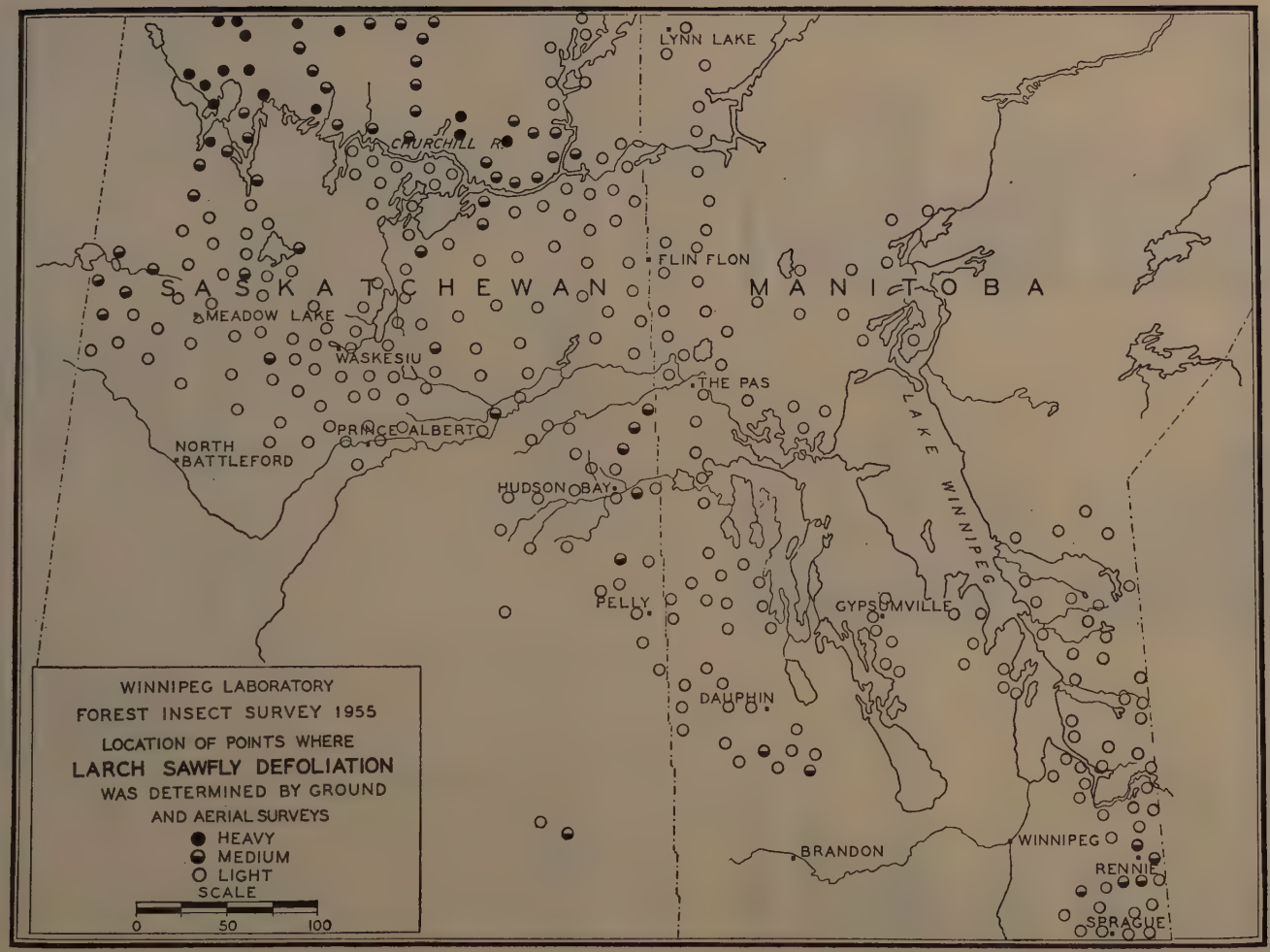
Reed, O. H.
Richard, G.
Richewhaller, J.
Ross, R.
Ruth, R.
Ruth, W. W.
Rutledge, H.

Sandall, Mr.
Sargent, W. W.
Selkirk, W.
Shannon, B.
Shipley, W.
Simpkin, W. H.
Skhworak, Miss J.
Smith, C. K.
Smith, C. M.
Stav, H. O.
Stubbington, S. W.

Taylor, Mrs. J.
Tirschman, H. C.
Titimore, R.
Tocher, Mr.
Toews, E.
Tucker, W.

Wahll, Miss L.
Webster, W.
Weir, N.
Wilson, J.
Woods, T.
Wright, J. J.

Zilkowski, B.


LYNN LAKE
CHURCHILL R.
FLIN FLON
SASKATCHEWAN
MANITOBA
MEADOW LAKE
WASKESIU
THE PAS
PRINCE ALBERT
NORTH BATTLEFORD
HUDSON BAY
LAKE WINNIPEG
PELLY
GYPSUMVILLE
DAUPHIN
BRANDON
WINNIPEG
RENNIE
SPRAGUE
WINNIPEG LABORATORY
FOREST INSECT SURVEY 1955
LOCATION OF POINTS WHERE
LARCH SAWFLY DEFOLIATION
WAS DETERMINED BY GROUND
AND AERIAL SURVEYS
HEAVY
MEDIUM
LIGHT
SCALE
0
50
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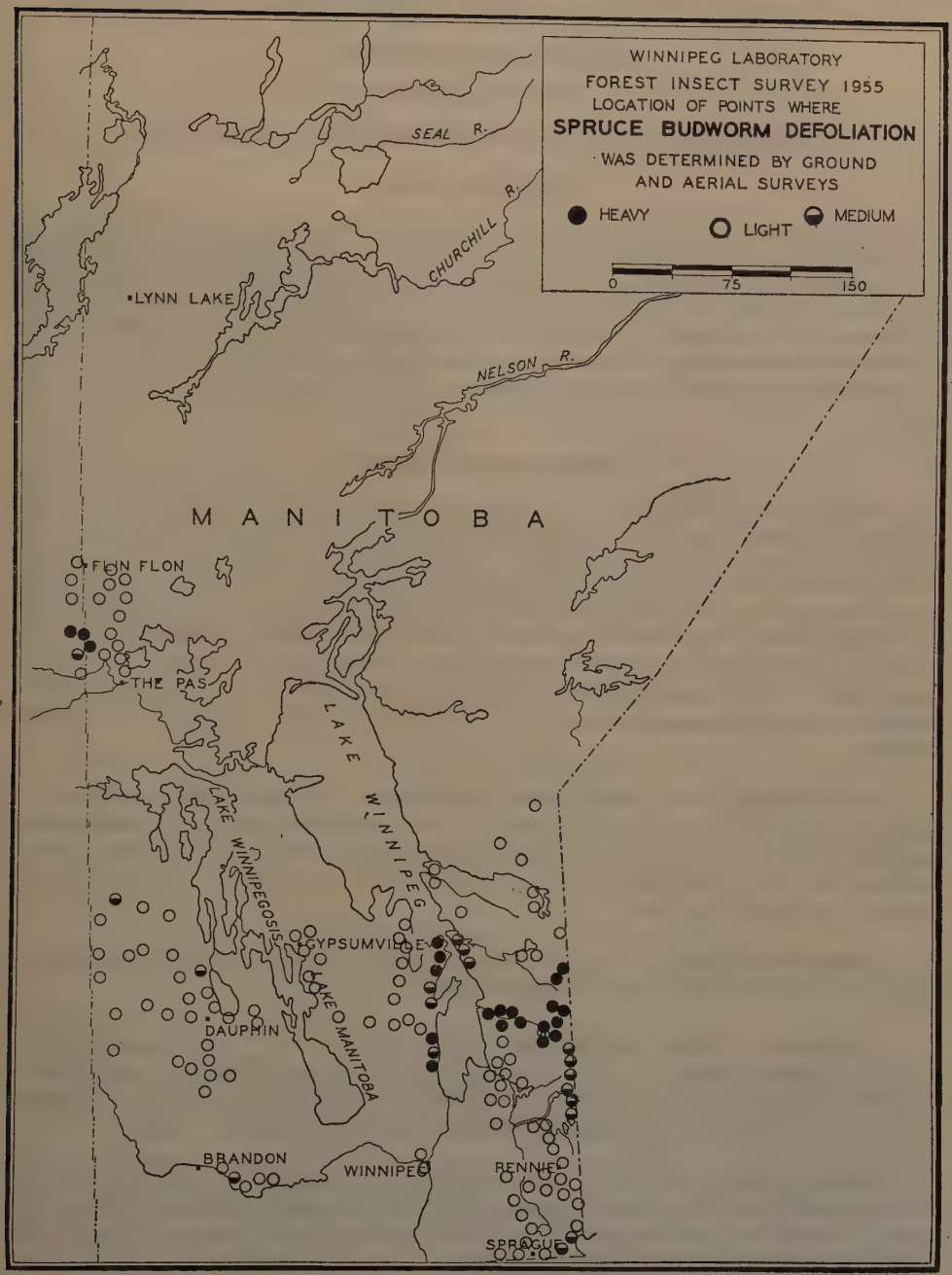
WINNIPEG LABORATORY
FOREST INSECT SURVEY 1955
LOCATION OF POINTS WHERE
SPRUCE BUDWORM DEFOLIATION
WAS DETERMINED BY GROUND
AND AERIAL SURVEYS
HEAVY
MEDIUM
LIGHT
0
75
150
SEAL R.
CHURCHILL R.
LYNN LAKE
NELSON R.
MANITOBA
FLIN FLON
THE PAS
LAKE WINNIPEG
LAKE WINNIPEGOSIS
GYPSUMVILLE
LAKE MANITOBA
DAUPHIN
BRANDON
WINNIPEG
RENNIE
SPRAGUE

# PROVINCES OF MANITOBA AND SASKATCHEWAN

## FOREST DISEASE SURVEY

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### INTRODUCTION

In the summer of 1955, efforts were concentrated on several specific diseases of regional importance. The objectives of the field program were to establish the eastern and northern limit of the range of jack pine mistletoe, the distribution of *Wallrothiella* on jack pine mistletoe, the western and northern limits of spruce mistletoe, the occurrence of coniferous seedling diseases, and the distribution of *Radulum casearium*. Observations were also maintained for unusual hosts of mistletoe and for alternate stages of rusts. This program will be continued in 1956.

### IMPORTANT DISEASES

***Jack Pine Mistletoe.***—A review of previous reports from the Prairie Provinces showed that jack pine mistletoe has a wide geographical range. The northern limits of the known range of this disease were extended in 1955 to Trade, Black Birch, and Careen lakes, at approximately 57° north latitude in Saskatchewan from the previous limit in the general vicinity of Churchill River, La Ronge, Torch River and The Pas. The most easterly records of jack pine mistletoe were from the Sandilands Forest Reserve and Stead, Manitoba. According to information from the Forest Pathology Laboratory, Maple, Ontario, the disease is now known to occur as far east as White Otter Lake, in the Kenora District.

***Wallrothiella on Jack Pine Mistletoe.***—*Wallrothiella arceuthobii*, a fungus parasite of jack pine mistletoe, was reported most frequently from localized areas in the mixedwood forests of Saskatchewan and Manitoba where most of the jack pine mistletoe occurs. Some *Wallrothiella* was found in the area of The Pas, Manitoba.

***Spruce Mistletoe.***—The western and northern limits of the known range of spruce mistletoe were not changed in 1955.

***Hypoxylon Canker of Poplar.***—A review of survey collections indicates that this disease occurs throughout central and southern Manitoba and Saskatchewan. In the extreme northern coniferous forest there have been no reports of hypoxylon canker, although this region has had a limited coverage.

***Decays.***—Red ring rot of conifers, which is general throughout the commercial forest in the central regions of Manitoba and Saskatchewan has now been reported on black spruce from Hatchet Lake, and Reindeer Lake in the northern coniferous forest of Saskatchewan.

The northern reported limit of white trunk rot of poplar (*Fomes igniarius*) has now been extended to Deschambault Lake in northern Saskatchewan.

# PROVINCE OF ALBERTA

## FOREST INSECT SURVEY

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### INTRODUCTION

The most destructive forest insects in Alberta in 1955 were the larch sawfly, the spruce budworm, and the yellow-headed spruce sawfly. The lodgepole needle miner continued to be the most important forest insect problem in the Banff, Yoho, and Kootenay national parks but was greatly reduced in numbers.

A river reconnaissance in the Northwest Territories was made possible by the acquisition of a boat in the early summer. Trips were made from Hay River on Great Slave Lake to Norman Wells on the Mackenzie River and up the Peace River from the town of Peace River, Alta., to the British Columbia boundary. An aerial survey was made of the large aspen tortrix infestation near Fort Vermilion, Alta., and of the spruce budworm outbreak near Wadlin Lake in northern Alberta.

Forest biology rangers submitted a large proportion of the 1,684 collections received at the Calgary Laboratory. Members of the Alberta Forest Service, the Alberta Department of Agriculture, and the Department of Northern Affairs and National Resources also made important contributions.

The number of insect collections from the principal tree species was as follows:

| Coniferous trees | Collections | Broad-leaved trees | Collections |
|---|---|---|---|
| Spruce | 665 | Trembling aspen | 181 |
| Pine | 216 | Willow | 55 |
| Larch | 222 | Box-elder | 52 |
| Douglas fir | 75 | Alder | 45 |
| Fir | 41 | Birch | 25 |
| Juniper | 6 | Poplar | 23 |
| | 1,225 | Elm | 15 |
| | | Ash | 12 |
| | | | 408 |
| Miscellaneous hosts | 51 | | |
| Grand Total | 1,684 | | |

### IMPORTANT INSECTS

***Larch Sawfly,*** *Pristiphora erichsonii* (Htg.).—The larch sawfly was found commonly in all the accessible areas of central and northern Alberta in 1955 and the known infestations are shown on the accompanying map. In northeastern Alberta, most larch stands were lightly defoliated as far north as the Clearwater River. Foresters reported the presence of the sawfly west of the Athabaska River, but the extent and severity of the infestations is unknown. In northwestern Alberta, light infestations were observed along the Mackenzie Highway as far as High Level at the junction of the road to Fort Vermilion.

Most of the heavily damaged tamarack stands were in the area bounded on the north by Lesser Slave and Calling lakes and by Edmonton and Spruce

Grove on the south. The degree of infestation varied considerably from area to area. Near the Saskatchewan boundary there was a general decline to medium intensity. Near Cold Lake, where defoliation has been severe for a number of years, up to 20 per cent tree mortality was observed.

***Spruce Budworm*** *Choristoneura fumiferana* (Clem.).—In 1954, a report was received of severe spruce budworm defoliation near Fort Norman, N.W.T. A reconnaissance trip was made down the Mackenzie River in 1955 to determine the extent and severity of the infestation. An outbreak of 1-year-cycle spruce budworm restricted to white spruce was observed along the Mackenzie River for a distance of about 400 miles from near Fort Simpson to 90 miles north of Norman Wells. In the Fort Simpson area, larvae were common but no noticeable defoliation was apparent. Severe defoliation was first observed at Camsell Bend, 75 miles northwest of Fort Simpson. From this point to Norman Wells, the degree of damage varied from light to severe. The tops of many trees in the severely infested areas were bare of foliage. The infestation also extended up many of the river valleys tributary to the Mackenzie. Although trips of varying length were made up the Liard and North Nahanni rivers, it was not possible to determine the actual limits of the infestation. Subsequent reports from the Department of Northern Affairs and National Resources indicated that spruce budworm damage was prevalent in spruce stands along the Liard River below Fort Liard, N.W.T. and for 40 miles up the Great Bear River. An infestation map based on the river survey and co-operators' reports accompanies this report.

The spruce needleworm, *Dioryctria reniculella* Grt., was found in association with the spruce budworm in the Mackenzie River outbreak. At McGern Island (62°45′N 123°10′W) approximately 25 per cent of the larvae collected in beating samples were spruce needleworms. Parasitism of spruce budworm was low. Laboratory examinations revealed that a few larvae died from capsule virus and microsporidial infections.

The infestation reported near Wadlin Lake in northern Alberta in 1954 was greatly reduced in size and intensity in 1955. When surveyed from the air late in June, no discoloration of foliage was observed. Ground checks showed that larvae were common and that light defoliation was evident on the new growth. Parasitism was low and could not have been responsible for the rapid decrease in budworm numbers.

***Yellow-headed Spruce Sawfly,*** *Pikonema alaskensis* (Roh.).—Population levels of the yellow-headed spruce sawfly on shelterbelts remained high in 1955. The heaviest infestations occurred in the area between Calgary and Edmonton and east to the Saskatchewan boundary. Severe stripping of shelterbelt trees was also reported from the Peace River Block in northern Alberta. Spruce trees in Edmonton were badly damaged. Light to moderate infestations were common wherever spruce shelterbelts were examined.

As in 1954, the only area in which forest trees were found to be seriously damaged was in the Livingstone Forest Reserve where a small acreage of young Engelmann spruce was attacked.

***Lodgepole Needle Miner,*** *Recurvaria* sp.—The infestations of lodgepole needle miner in the Rocky Mountain national parks were greatly reduced by the unfavorable weather conditions in the fall of 1954. In 1955 the highest population levels were found at the mouth of the Cascade Valley and on the shoulder of Mount Girouard near the eastern boundary of Banff National Park. These infestations, which were of limited extent, were classed as medium-light. With the exception of these two small areas, lodgepole pine stands in Banff, Kootenay, Yoho, and Jasper parks showed little or no needle miner damage.

***Forest Tent Caterpillar,*** *Malacosoma disstria* Hbn.—An aspen stand at Mile 103 on the Mackenzie Highway was moderately defoliated by the forest tent caterpillar in 1955. This is the only area from which this insect was received. Parasitism was low. Egg counts in the fall indicated that the forest tent caterpillar will likely be present in about the same numbers in 1956.

***Black-headed Budworm,*** *Acleris variana* (Fern.).—Population levels of the black-headed budworm were lower in northern Alberta in 1955 than they were in 1954. In the northern part of the eastern slopes area, population levels remained the same as in 1954. In the southern part, black-headed budworm larvae were more common in 1955, especially in the Porcupine and Cypress Hills areas.

In the Porcupine Hills, Douglas fir was more heavily attacked than spruce. As many as 200 larvae were collected from one small open-grown Douglas fir tree.

***Large Aspen Tortrix,*** *Choristoneura conflictana* (Wlk.).—Defoliation of aspen by this insect was less severe in 1955 than in 1954. An aerial survey showed that the outbreak was restricted to the south bank of the Peace River near Fort Vermilion, Alta. Infestation extended along the river for about 10 miles and was from 2 to 3 miles wide. A small patch of defoliation was seen on the north side of the River 3 miles north of the Fort Vermilion ferry. Defoliation in these areas was light to moderate.

Other small patches of light to moderate defoliation were found at the following locations: Mile 290 on the Mackenzie Highway, 25 miles south of Grande Prairie, 7 miles southeast of Grovesdale, and at several places between Beaverlodge and the British Columbia boundary.

Infestations in southwestern Alberta were similar to those reported in 1954. Moderate to heavy damage occurred in the West Porcupine Hills and in the Waterton Lakes National Park.

***Spruce Spider Mite,*** *Paratetranychus ununguis* (Jac.).—Spruce trees in Edmonton were heavily infested with this mite in 1955 and many park and boulevard trees were severely damaged. The mite was present in most spruce plantings in central Alberta. Young trees were often killed or their growth seriously retarded. Infestations on older trees caused branch killing and serious loss of foliage. Moderate infestations of the spruce mite occurred in Banff and Jasper townsites.

***Fall Cankerworm,*** *Alsophila pometaria* (Harr.).—Many shelterbelt plantings in the southern part of the agricultural region of Alberta were infested with the fall cankerworm. In the Lethbridge Agricultural District light to medium defoliation occurred on green ash, box-elder, and white elm. The heaviest infestations were north of Chin and Coaldale.

In the Medicine Hat Agricultural District light to medium infestations were found on all shelterbelts visited.

***Western Tent Caterpillar,*** *Malacosoma pluviale* (Dyar).—This insect was more plentiful in 1955 than in 1954. Large numbers of tents were observed along the Mackenzie Highway from the Alberta boundary to Hay River, N.W.T. Tents were most plentiful on scrub birch, rose, and willow. Most of these were found on the cleared right-of-way beside the Highway but in some places they extended back to the scrub birch and willow in the muskegs.

In the Waterton Lakes National Park this species was common on rose, choke cherry, gooseberry, and saskatoon along the Red Rock Canyon road. Smaller numbers of tents were found at Medicine Hat, Cardston. and south of Hillcrest.

***American Poplar Beetle,*** *Gonioctena americana* (Schaeff.).—The American poplar beetle was scarce in many of the areas from which it was reported in 1954. In the Porcupine Hills and in Waterton Lakes National Park it was associated with the large aspen tortrix and caused considerable defoliation.

***Balsam-fir Sawfly,*** *Neodiprion abietis* (Harr.).—Few larvae of this species or of other species of *Neodiprion* were collected in 1955. Beating samples seldom contained more than one or two larvae.

***Spruce Gall Aphids,*** *Adelges* spp. and *Pineus* spp.—Several species of adelgids causing galls on white spruce were common throughout Alberta. Galls of *Adelges cooleyi* (Gill.) were very numerous on spruce on the eastern slopes of the Rocky Mountains. Old galls of this insect remain on the trees from year to year and are objectionable around resort areas in the national parks. Attacks on Douglas fir, the secondary host, caused twisting and yellowing of the needles.

Other species found in Alberta were *Adelges lariciatus* (Patch), *Pineus pinifoliae* (Fitch), and *P.* prob. *similis* (Gill.) on white spruce and *Adelges strobilobius* (Kltb.) on black spruce.

***Pine needle Scale,*** *Phenacaspis pinifoliae* (Fitch).—A severe infestation of pine needle scale on lodgepole pine was found along a 3-mile strip on the Adanac Mine road in the Crowsnest Forest District. The scales were thickly clustered on the needles and discoloration and defoliation were very noticeable. Most of the females on the needles had developed in 1954 and 1955 indicating that the infestation had built up rapidly over the last two years.

There was a light infestation on Douglas fir between Radium Hot Springs and the southern gate of Kootenay National Park.

***Pitch Nodule Makers,*** *Petrova* spp.—Pitch nodule makers caused damage to both jack and lodgepole pines in northwestern Alberta. The most serious infestations occurred on jack pine trees along the Wapiti River from its mouth to approximately 35 miles upstream.

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Cuester, F.

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Enwright, C. E.

Gylander, J. R.

Joly, C. O.

Keith, D. E.
Kenns, J. L.
Kun, S.

Leiren, O.

Marrit, J. W.
Marsh, A. H.
McQuitty, S.
Mitchel, V. W.

Pettem, S. W.
Pooke, W.
Proctor, W. C.

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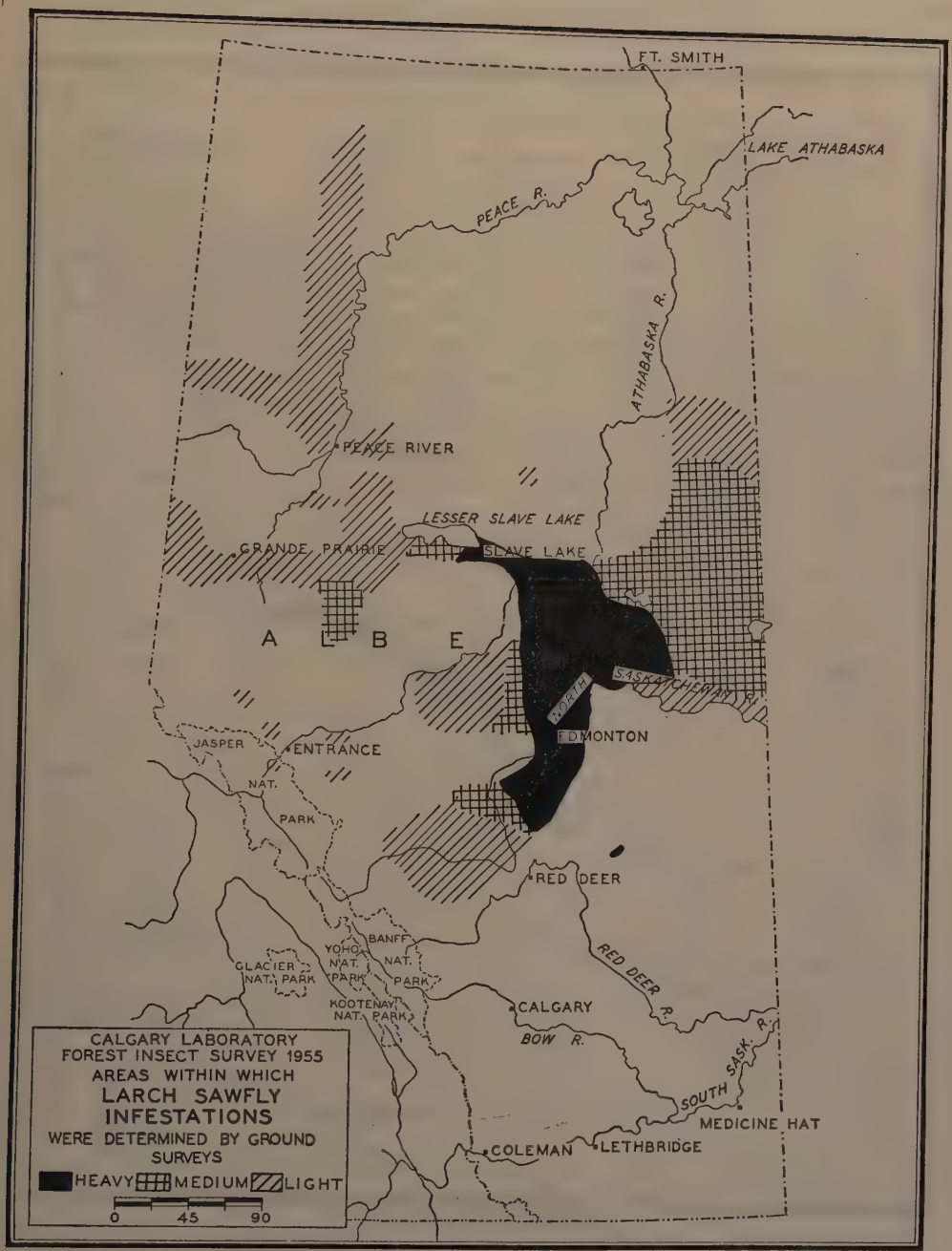
Reap, M. P.

Skov, L.
Smith, F. E.
Snyder, D. K.

Theriault, F. A.
Thompson, R. W.
Thompson, S.

Walker, K. H.
Williams, L. D.


FT. SMITH
LAKE ATHABASKA
PEACE R.
ATHABASKA R.
PEACE RIVER
LESSER SLAVE LAKE
GRANDE PRAIRIE
SLAVE LAKE
A L B E
NORTH SASKATCHEWAN R.
EDMONTON
JASPER NAT. PARK
ENTRANCE
RED DEER
BANFF NAT. PARK
YOHO NAT. PARK
GLACIER NAT. PARK
KOOTENAY NAT. PARK
RED DEER R.
CALGARY
BOW R.
SOUTH SASK. R.
MEDICINE HAT
COLEMAN
LETHBRIDGE
CALGARY LABORATORY
FOREST INSECT SURVEY 1955
AREAS WITHIN WHICH
LARCH SAWFLY
INFESTATIONS
WERE DETERMINED BY GROUND SURVEYS
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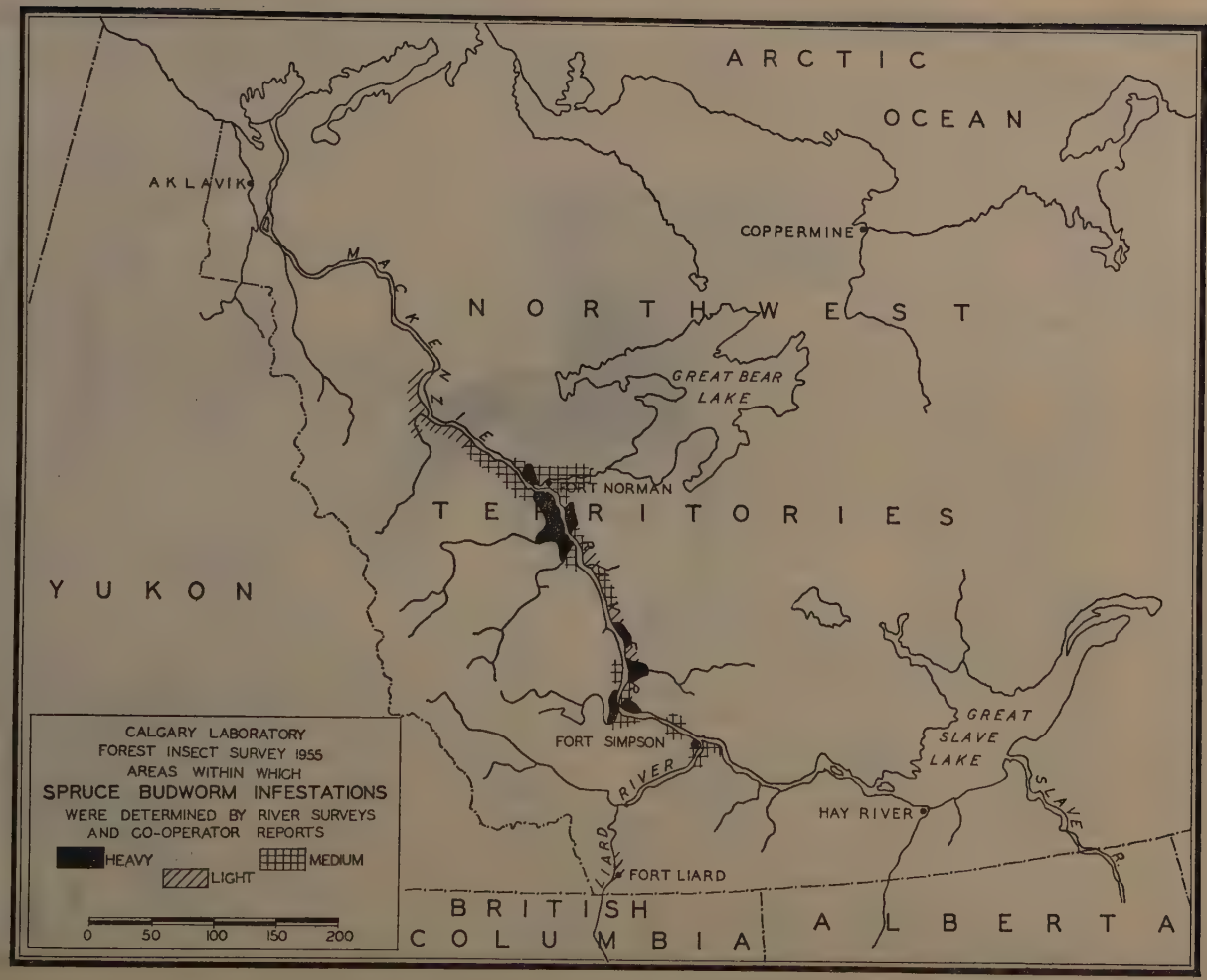
ARCTIC
OCEAN
AKLAVIK
COPPERMINE
MACKENZIE
NORTHWEST
GREAT BEAR
LAKE
FORT NORMAN
TERRITORIES
YUKON
CALGARY LABORATORY
FOREST INSECT SURVEY 1955
AREAS WITHIN WHICH
SPRUCE BUDWORM INFESTATIONS
WERE DETERMINED BY RIVER SURVEYS
AND CO-OPERATOR REPORTS
HEAVY
MEDIUM
LIGHT
0 50 100 150 200
FORT SIMPSON
LIARD RIVER
GREAT
SLAVE
LAKE
HAY RIVER
SLAVE R.
FORT LIARD
BRITISH
COLUMBIA
ALBERTA

# PROVINCE OF ALBERTA

## FOREST DISEASE SURVEY

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### INTRODUCTION

During the 1954 field season, Forest Disease Survey activities in Alberta followed the pattern set in previous years. The detection aspects of the survey were stressed and attention was restricted to organisms capable of causing appreciable economic loss. A good quantity of material was collected for a projected study of the wood-inhabiting Thelephoraceae of Alberta.

A total of 583 specimens was processed in 1955. Of these, 267 have been identified, 62 were discarded as unidentifiable, and 206 have been identified as to family. This latter group is made up largely of Thelephoraceae which have been filed pending further detailed study. At the time of writing, 48 specimens were unidentified comprising collections from dead material made by the Forest Pathology staff.

Once again, it is a pleasure to acknowledge the valuable assistance of members of the Mycology Unit, Botany and Plant Pathology Division, Ottawa, in identifying fungi.

The collections were distributed among the various host trees as follows:

| Coniferous trees | Collections | Broad-leaved trees | Collections |
|---|---|---|---|
| Pine— | | Poplar | |
| Lodgepole pine | 212 | Trembling aspen | 80 |
| Jack pine | 12 | Balsam poplar | 6 |
| Spruce— | | White birch | 5 |
| White spruce | 95 | | |
| Engelmann spruce | 9 | Willow | 9 |
| Black spruce | 7 | | |
| | | Other broad-leaved trees | 60 |
| Fir— | | | |
| Douglas fir | 16 | Total | 160 |
| Alpine fir | 13 | | |
| Balsam fir | 3 | | |
| Larch— | | | |
| Western larch | 3 | | |
| Eastern larch | 3 | | |
| Other conifers | 30 | | |
| Total | 403 | | |

| | |
|---|---|
| Miscellaneous hosts | 20 |
| Grand Total | 583 |

### IMPORTANT DISEASES

***Hypoxylon Canker of Poplar***—No important extension in the known range of this disease was made during the 1955 field season. Future sampling of this disease will be directed toward the discovery of heavily infected stands within the known geographical limits of the disease.

***Spruce Needle Rust.***—In 1955, a severe outbreak of this disease occurred in the Lac La Biche-Philomena area, approximately 120 airline miles northeast of Edmonton. The rust fungus involved was principally *Chrysomyxa ledicola* (Pk.) Lagerh. Most spruce trees within a 12-mile radius of Imperial Mills showed severe discoloration of the foliage in August and by late September most of the affected needles had fallen. Many commercial stands of spruce were involved. No tree mortality is expected, but some reduction in increment will result.

Some 100 miles westward, in the vicinity of Smith and Spurfield, other heavily infected spruce stands were noted.

This needle rust was widespread in 1954 but no areas of severe intensity were observed. During 1955, however, very little spruce needle rust was found except in the two areas of heavy incidence noted above.

***Atropellis Canker of Pine.***—In the 1954 Report, an area of severe *Atropellis* infection (*Atropellis piniphila* (Weir) Lohman & Cash) on lodgepole pine was noted in the Robb-Coalspur area of west-central Alberta. Further intensive sampling was carried out in 1955 to confirm the boundaries of the outbreak.

A total of 1,260 lodgepole pine trees was examined with binoculars for the presence or absence of *A. piniphila* cankers. The trees examined were distributed in groups of twenty, throughout the area thought to contain appreciable *Atropellis* infection. Heavy infection was arbitrarily defined as 70 per cent or more of the trees attacked, and an area of approximately 125 square miles was found to be in this category. Surrounding this area of heavy infection, an area of approximately 180 square miles was delimited in which the incidence of *Atropellis* was between 40 and 70 per cent.

*Atropellis* appears to be a relatively slow killer and apparently there is little immediate danger of mortality in the extensive pole-sized stands in the area. The stands should be carefully watched, however, in order to determine when tree death commences. The characteristic blue-black stain in the wood beneath the cankers will degrade both lumber and pulp wood.

Another smaller area of heavy *Atropellis* incidence was found in Waterton Lakes National Park. An area of approximately 6 square miles of forest composed largely of pole-sized lodgepole pine was infected with *Atropellis*. Of the 24 sample areas, none showed an *Atropellis* incidence of under 70 per cent. The average percentage of infection was 89·3.

Preliminary reconnaissance indicated that the following areas probably support high *Atropellis* populations: Allison Creek Valley and parts of the Castle River Valley in southern Alberta, as well as parts of the Upper Spray Valley in the Bow River Forest Reserve.

***Lodgepole Pine Mistletoe.***—No extension of the known geographic distribution of this parasite (*Arceuthobium americanum* Nutt. ex Engelm.) in the Alberta region was made during the 1955 field season.

A survey was conducted on part of the Kananaskis Forest Experiment Station where detailed information on dwarf mistletoe conditions should be of value in planning the forest research program. This survey, utilizing one-chain strips spaced 10 chains apart, revealed that at least 8 per cent of the pines were infected in the 5 square mile area covered.

***Needle Cast of Lodgepole Pine.***—This disease, caused by *Hypodermella montivaga* (Petrak) Dearn., was present in epidemic proportions in parts of Banff and Jasper national parks in 1955. The areas involved were those in which the disease was reported as severe in 1954. These regions have sustained a heavy lodgepole pine needle miner attack in previous years. During 1955, the attack was heaviest on 1954 foliage. Some infected 1953 foliage was noted,

but the fruiting bodies were old, having released their spores during the summer of 1954. No fruit bodies were found on 1955 foliage. The presence of the disease has prevented the use of aerial surveys for the ledgepole pine needle miner.

***White Trunk Rot of Poplar.***—No important changes in the known range of this disease of poplar caused by *Fomes igniarius* (L. ex Fr.) Gill. were made during 1955.

***Winter Injury of Pine.***—The various forms of "Red Belt" or winter damage were remarkably absent from the mountain and foothills region of western Alberta during the 1955 field season.

**OTHER NOTEWORTHY DISEASES**

| Host | Organism | Locality | Remarks |
|---|---|---|---|
| Aspen, trembling... | *Cytospora chrysosperma*, Fr. | Meikle River, Alta..... | Northernmost station in Alta. for this canker of poplar. |
| | *Fomes fomentarius* (L. ex Fr.) Kickx | Liard River, N.W.T..... | Northernmost station for this trunk rot in Alta. vicinity. |
| | *Sclerotium sp*..... | Widespread in foothills and mountain region of Alta. | Marked reduction in severity since 1954. Reported as *Ciborinia bifrons* (Whet.) Whet. in 1954. |
| | *Radulum casearium* (Morgan) Lloyd | Robb, Notikewin, Alta... | First reports of this trunk rot in Alta. |
| Fir, alpine..... | *Echinodontium tinctorium* Ell. & Ev. | Dutch Creek, Alta..... | Unusually heavy incidence of this rot in overmature stand. |
| Fir, balsam..... | *Hypodermataceae*..... | Wadlin Creek, Alta..... | Unidentified needle cast in epidemic proportions. |
| Fir, Douglas..... | *Rhabdocline pseudotsugae* Syd. | Sinclair Canyon, Kootenay National Park, B.C. | Needle cast, new record for Kootenay National Park, B.C. |
| Juniper..... | *Lophodermium juniperinum* (Fr.) de Notaris | Whirlpool Bridge, Jasper National Park, Alta. | First record for Alta. |
| Larch, eastern..... | *Cytospora curreyi* Sacc.... | 35 mi. south of Grande Prairie, Alta. | Causing stem canker in small trees. First record for Alta. |
| Larch, western..... | *Cytospora curreyi* Sacc.... | Settlers Road, Kootenay National Park, B.C. | Causing stem canker in young trees. First report from Kootenay National Park, B.C. |
| Poplar, balsam.... | *Linospora tetraspora* Thomas | Scattered in east-central Alta. | Leaf spot causing appreciable premature leaf drop in some areas. |
| Pine, jack..... | *Elytroderma deformans* (Weir) Darker | Grande Prairie, Alta..... | First report of this needle cast in Alta. |
| Pine, lodgepole.... | *Elytroderma deformans* (Weir) Dark | Settlers Road, Kootenay National Park, B.C. | Known to cause serious losses in ponderosa pine. |
| | Hail damage..... | South of Strachan, Alta... | Heavy mortality in pole-sized stands, storm dates from 1947-48. |
| | *Hypodermella concolor* (Dearn.) Darker..... | Jasper, Alta..... | Needle cast found occasionally in association with other needle cast, *H. montivaga* (See Important Diseases). |
| Spruce, white..... | *Fomes pinicola* (Sw.) Cooke | Liard River, N.W.T..... | Northernmost record of this trunk rot in the Alta. region. |
| | *Polyporus abietinus* Dicks. ex Fr. | Fort Providence, N.W.T. | Northernmost record of this trunk rot in the Alta. region. |

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Marritt, J. W.
Michael, H. H.
Stollings, E. H.
Theriault, F. A.

# PROVINCE OF BRITISH COLUMBIA

## FOREST INSECT SURVEY

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### INTRODUCTION

As in previous years, the British Columbia Forest Service and private companies gave valuable assistance, not only in making collections and reporting on insect outbreaks, but also in providing aircraft for aerial reconnaissance and mapping infestations. Three forest insects caused considerable injury in British Columbia in 1955. The black-headed budworm defoliated hemlock stands in both the coastal and interior parts of the Province, the spruce budworm outbreak in the Vancouver District persisted, and the Douglas-fir beetle continued to attack Douglas fir stands particularly in the Kamloops Forest District.

The Victoria laboratory received 1,801 insect collections, and the Vernon sub-laboratory 2,470 for a total of 4,271. Collections received during 1955 were distributed among the principal tree species as follows:

| Coniferous trees | Collections | |
|---|---|---|
| Douglas fir | | 1,099 |
| Hemlock— | | |
| Western hemlock | 688 | |
| Mountain hemlock | 28 | |
| | | 716 |
| Spruce— | | |
| White spruce | 426 | |
| Engelmann spruce | 190 | |
| Black spruce | 41 | |
| Sitka spruce | 24 | |
| | | 681 |
| Pine— | | |
| Lodgepole pine | 272 | |
| Ponderosa pine | 166 | |
| Western white pine | 74 | |
| | | 512 |
| Fir— | | |
| Alpine fir | 268 | |
| Amabilis fir | 51 | |
| Grand fir | 20 | |
| | | 339 |
| Cedar— | | |
| Western red cedar | 128 | |
| Miscellaneous cedars | 2 | |
| | | 130 |
| Larch— | | |
| Western large | 110 | |
| Tamarack | 13 | |
| Alpine larch | 3 | |
| | | 126 |
| Juniper— | | |
| Rocky Mountain juniper | 36 | |
| Common juniper | 2 | |
| | | 38 |
| Other coniferous trees | | 3 |
| Total | | 3,644 |

| Broad-leaved trees | Collections | |
|---|---|---|
| Poplar— | | |
| Trembling aspen | 167 | |
| Black cottonwood | 20 | |
| Miscellaneous poplars | 9 | |
| | | 196 |
| Alder— | | |
| Red alder | 97 | |
| Green alder | 2 | |
| Mountain alder | 2 | |
| Miscellaneous alders | 16 | |
| | | 117 |
| Willow | | 85 |
| Birch | | 32 |
| Garry oak | | 14 |
| Maple | | 10 |
| Cherry | | 9 |
| Arbutus | | 3 |
| Miscellaneous broad-leaved trees | | 9 |
| Total | | 475 |

| | |
|---|---|
| Miscellaneous hosts or no hosts specified | 152 |
| Grand Total | 4,271 |

***Spruce Budworm,*** *Choristoneura fumiferana* (Clem.).—The known extent of the 1-year-cycle spruce budworm outbreak in the Lillooet and Fraser-Nahatlatch river valleys increased to approximately 171 square miles, with 30 square miles of this area in the Fraser-Nahatlatch region. This is an increase of 58 square miles compared with 1954, but some of these infested stands had been attacked the previous year. Douglas fir was the principal host. As in 1954, feeding extended from the valley floors to an altitude of about 3,000 feet. Defoliation, although heavy, was slighly less than last year and was restricted mostly to new growth. Many of the trees put out numerous adventitious buds. Some top killing appears imminent, but tree mortality is expected only in a few unmerchantable stands on dry hilltops, where approximately 30 per cent of the trees did not produce adventitious buds.

Insect mortality due to natural factors increased in 1955. Estimated larval mortality at the time of spring establishment was a minimum of 22 per cent. The average larval parasitism was 22 per cent, an increase from the 8 per cent recorded in 1954. The most abundant larval parasite was *Glypta fumiferanae* (Vier.). Pupal parasitism amounted to 55 per cent. The percentage of egg masses containing one or more parasites averaged 27. No diseased larvae were found.

Egg counts averaged 112 masses per 100 square feet of foliage compared with an average of 221 in 1954. The infestation has probably passed its peak since the population is decreasing and parasitism is increasing.

During 1955, the 2-year-cycle budworm outbreak in the spruce and alpine fir stands of central British Columbia continued to diminish within the areas that sustained heavy tree defoliation prior to 1953. The most noteworthy decreases occurred in the Wells-Barkerville region; in Pine Pass, where there was severe defoliation in 1954; and in the overmature stands of the Nation River area where the budworm population has almost disappeared.

In 1955, spruce budworm larvae were fairly numerous along the Hart Highway between the Parsnip and Misinchinka rivers; from Tudyah Lake south to Summit Lake; in the mountains northeast of Sinclair Mills; in the vicinity of Bowron Lake; and in several localities north of Fort St. James.

Since 1955 was a "non-flight year" feeding was inconspicuous from the air and therefore the status of this insect in inaccessible regions could not be ascertained.

The 2-year-cycle budworm outbreaks at Babine Lake, Star Lake, and McKendrick Creek, all in the Prince Rupert Forest District, continued to subside although light to medium infestations persisted. Collections: Coast 128, Interior 150.

***Douglas-fir Beetle,*** *Dendroctonus pseudotsugae* Hopk.—The Douglas-fir beetle continued to kill numerous groups of trees in the Kamloops and Prince George forest districts. Little current attack was observed in the Nelson Forest District.

Current infestations are restricted chiefly to a broad strip of country extending from the Fraser River south of Prince George southeastward into the dry belt as far as Okanagan Lake (see accompanying map). The severest attack occurred near Kamloops, especially in the Tranquille Forest Reserve, and near Bestwick. Along the west side of the Fraser River, south of Quesnel, the infestation appeared to decrease in 1955, but infested trees were still abundant over an area of about 50 square miles. Innumerable small infestations were scattered through the northern Cariboo, from Lac la Hache to Marguerite.

On Vancouver Island new attacks occurred in the Nimpkish Valley infestation although the situation was no worse than in 1954. Logging is now in operation to salvage some of the timber killed in the past two years. Spot infestations were numerous at both ends of Woss Lake, just north of the Nimpkish infestation. New attacks and recently killed trees were observed in the Lillooet River Valley and in the Anderson River Valley near Boston Bar, Vancouver Forest District, where a large number of beetles were found in felled timber associated with logging operations.

***Mountain Pine Beetle,*** *Dendroctonus monticolae* Hopk.—Excepting the infestations in lodgepole pine in central British Columbia, there was a general decrease in population levels of the mountain pine beetle in 1955. Small infestations were observed in a few areas.

An extensive, long-established infestation on lodgepole pine appears to be gaining in intensity along the Stuart-Trembleur-Takla Lake drainage system in central British Columbia. Heaviest tree mortality is centered along the lower end of Takla Lake in a decadent lodgepole pine stand; 300 attacked trees were counted near the mouth of Bivouac Creek, 800 on the slopes above Leos Creek, and about the same number near the mouth of Sakeniche River south of Takla Narrows. Scattered groups extend to the southeast as far as Tarnezell Lake. A light but widespread outbreak was discovered in the Narcosli Creek area in mature, undisturbed stands of lodgepole pine. Apparently the population level is increasing. A large outbreak on the east side of Babine Lake extended from a point opposite Pierre Creek north to and including Morrison Lake. A 2- by 5-chain plot south of Big Loon Lake contained 80 red-top or dead trees, 9 green-infested trees, and 64 uninfested trees. The most active infestation in southern British Columbia was on Steamboat Mountain. It contained 5 groups, each of 20 to 40 infested trees. Small patches of infested lodgepole pine were particularly common in the Kootenay River basin, northeast of Canal Flats.

Small active infestations in western white pine were observed north of Beach Bay on Shuswap Lake, along Asher Creek at Trout Lake, and along Beaton Creek; scattered infested trees occurred along the Big Bend Highway.

In 1955, the populations of *Dendroctonus monticolae*, *D. valens* Lec., and *D. brevicomis* Lec. on ponderosa pine decreased further at Alleyne Lake in the Aspen Grove country; a few groups of currently attacked trees were observed.

***Spruce Bark Beetles,*** *Dendroctonus* spp.—The small infestations of these bark beetles on Engelmann spruce in the Nelson Forest District appear to have been greatly reduced during the past two or three years. However, fairly large numbers were observed at several localities in felled logs and in slash.

***Western Hemlock Looper,*** *Lambdina fiscellaria lugubrosa* (Hlst.).—There was a general decrease in the hemlock looper populations in the Province in 1955.

The heaviest infestation in the Interior occurred in a stand of mature and overmature hemlock and cedar some 3 miles south of McBride in the Prince George Forest District. Noticeable defoliation ranging from 30 to 100 per cent, was observed over an area 2 miles long by ½ mile wide. The infestation 3 miles south of Penny in an overmature stand was again severe, but larval numbers had decreased. Both a polyhedral virus and a pathogenic fungus, *Empusa* sp., were found in larvae collected in the McBride-Penny region. The Eaglet Lake-Fraser River infestation collapsed. Alpine fir in this area have suffered severe damage; a few trees up to 12 inches D.B.H. died after the recent attack. As a result of the severe defoliation, "stag-heads" will probably appear on some of the overmature hemlock stands. Understory hemlock trees that

were almost completely denuded during the recent infestation appear to be recovering. A light infestation persisted near Ptarmigan Creek in the Prince George Forest District.

The hemlock looper population along the Big Bend Highway, boardering the Columbia River, decreased somewhat although there were light infestations in some sections.

Hemlock looper population levels remained relatively low throughout the coastal areas. A reduction was noted in the light infestation at Scully Creek in the Prince Rupert Forest District. Larvae were also found commonly in the Lakelse Lake – Terrace areas. In the Lillooet River Valley, the looper was found in association with the spruce budworm, but numbers were not high enough to cause concern. Up to five larvae per 3-tree beating sample were found in the Nitinat River area, South Vancouver Island District, the scene of an old hemlock looper infestation. Collections: Coast 100, Interior 159.

***Black-headed Budworm,*** *Acleris variana* (Fern.).—During 1955 there was a general increase in black-headed budworm population levels.

Scattered top killing was observed along the Portland Canal, Prince Rupert District. A small amount of tree mortality, restricted mainly to overmature hemlock, was also recorded. At least part of this damage was attributed to heavy defoliation suffered in the black-headed budworm outbreak which subsided in this area in 1954. Although larvae were still present, their numbers decreased in the Ecstall River Valley, Skeena River Valley, Kitsumgallum Lake, Lava Lake, and the Nass River area. On the Queen Charlotte Islands, heavy defoliation persisted along the inlets on the east coast of Moresby Island, particularly at Cumshewa Inlet, and in the Honna River Valley west of Queen Charlotte City on Graham Island. Feeding was lighter on the remainder of Graham Island. Larval parasitism averaged 19 per cent, with a high of 33 per cent at Moresby Camp. A capsule virus was found in some larvae, but the disease was not epidemic. There appeared to be a scarcity of pupae, and the initial egg survey failed to reveal a single egg. Further surveys are being made to verify these results.

A medium to heavy infestation was reported in the Ocean Falls and Bella Coola areas in the South Prince Rupert District. The heaviest defoliation occurred in a few immature hemlock stands at South Bentinck Arm and Labouchere Channel where at least 60 per cent of the current year's foliage was destroyed. Parasites killed 22 per cent of the larvae collected in this area.

The black-headed budworm on North Vancouver Island increased greatly in 1955, both in numbers and in extent. The known infestation, mapped by aerial and ground surveys, extended over at least 1,600 square miles of hemlock and fir stands. The heaviest defoliation occurred in the following regions: north and east of Holberg Inlet, the west and east sides of Neroutsos Arm, the Kashutl and Kaouk River valleys on the west coast, the Nimpkish and Bonanaza Lake areas, and along the east coast of the Island from Port McNeil south to Adam River. Feeding was restricted to altitudes below 4,000 feet. The top third of the crowns suffered the heaviest damage, and in some cases tops were completely defoliated for 5 to 20 feet. No tree mortality has been observed but some top killing appears imminent. Larval parasitism did not exceed 15 per cent in any area, and pupal parasitism was with one exception also light. Pupae collected at Sayward outside the main infestation, were 90 per cent parasitized. Egg counts indicated that light to heavy defoliation can be expected in 1956, barring an unforeseen collapse of the population due to natural control factors.

Light infestations were observed in the Interior at a number of places including the area between Miles 40 and 60 on the Haines Road. A medium infestation of black-headed budworm, together with *Neodiprion* sp., occurred in mature and overmature hemlocks from Miles 15 to 22, and 40 to 45 on the Big Bend

Highway north of Revelstoke, the area affected totalling about 10 square miles. The major portion of this infestation occurred on the west side of the Columbia River between altitudes of 2,500 and 3,200 feet. Collections: Coast 202, Interior 197.

***Forest Tent Caterpillar,*** *Malacosoma disstria* Hbn.—There were no forest tent caterpillar infestations in the Interior of British Columbia during 1955. Large numbers of eggs were laid in the fall of 1954 in the Prince George Forest District, and a few points in the Kamloops and Nelson Forest districts, but the majority failed to hatch. In some instances egg mortality apparently occurred early in the fall, for there was no embryonic development. At Summit Lake in the Nelson Forest District, where an apparently normal hatch of eggs occurred, a disease wiped out the population in the early larval instars.

Forest tent caterpillars were found in association with western tent caterpillars on South Vancouver Island. The infestation was light and confined mostly to the southern portion of the Saanich Peninsula. Collections: Coast 2, Interior 8.

***Western Tent Caterpillar,*** *Malacosoma pluviale* (Dyar).—Heavy defoliation of red alder, apple, willow, wild rose, and cherry occurred again in the Fraser River Valley, the Strait Islands, and in the Saanich Peninsula, Vancouver Island. No damage was reported outside of the Vancouver Forest District. Disease was probably responsible for the heavy larval mortality in some sections of the Fraser Valley, and a polyhedral virus disease caused high mortality around Victoria. Field records indicated a medium to heavy egg population in the Saanich Peninsula. Collections: Coast 74, Interior 10.

***Douglas-fir Needle Miner,*** *Contarinia* sp.—There was a general decrease in Douglas-fir needle miner numbers during 1954-55, although the larval population level remained fairly high in certain parts of the Province.

In the Kamloops Forest District, the infestation at Squilax diminished to a mere trace. The infestation at Peachland also decreased, although some 50 per cent of the current year's needles were mined. The percentage of needles mined ranged from 15 to 25 at points sampled at Shuswap Lake, and from 10 to 20 in the Barriere region along the North Thompson River. The degree of infestation in other sample localities in the Kamploops Forest District was as follows: Oyama, 15 to 30 per cent; Powers Creek in Westbank, and Hydraulic Creek in Kelowna up to 85 per cent; Chute and Trout creeks near Penticton, 30 per cent; and Lytton, 30 per cent.

In the Nelson Forest District, a heavy infestation was observed near Cascade and Grand Forks where some 50 to 90 per cent of the new needles were mined. Other infestations noted in this district and the degree of needle damage were as follows: Granby and Burrell rivers, 25 to 35 per cent; Beaverdell and Midway, up to 45 per cent; and Needles and North Castlegar, 15 to 30 per cent.

During 1955 no infestations were recorded in the Prince George Forest District.

On Vancouver Island two infestations were reported at Black Creek and Cassidy where 50 and 20 per cent respectively of the needles were mined. Collections: Coast 3, Interior 73.

***Silver-spotted Halisidota,*** *Halisidota argentata* Pack.—There was a marked increase in the abundance of this species as compared with 1954. The insect was found on the southern half of Vancouver Island as far north as Campbell River, on the Gulf Islands, and throughout the southern mainland. The heaviest infestations were near tide-water and in the southern portion of the Vancouver Forest District. Although feeding was heavy in localized areas

there was no permanent damage and all trees refoliated by July. The preferred host was Douglas fir, but lodgepole pine, hemlock, and grand fir were also attacked. Parasitism remained essentially the same as in 1954, and was still too light to effect much control. The predominant parasite was *Uromacquartia halisidotae* Tns. No disease was found. Collections: Coast 95.

***Hemlock Sawfly,*** *Neodiprion tsugae* Midd.—The hemlock sawfly increased to epidemic proportions in a few localities in 1955. Larvae were numerous on the Big Bend Highway between Revelstoke and Downie Creek in association with the black-headed budworm, and from north of Kinbasket Lake to north of Donald in association with the hemlock looper. Light defoliation of hemlock trees bordering forest openings was observed in the Sinclair Mills and Eaglet Mountain areas, Prince George Forest District. On Eaglet Mountain, the population level was especially high on the northern slopes where defoliation by hemlock looper was severe in 1954.

The hemlock sawfly was widespread throughout the coastal areas in 1955. Numerous colonies were found at Stewart in the Prince Rupert Forest District but no serious damage was reported. Collections (*Neodiprion* spp.): Coast 130, Interior 425.

***Satin Moth,*** *Stilpnotia salicis* (L.).—Heavy defoliation of several groves of trembling aspen trees at Currie Lake and near Lac du Bois recurred in 1955. Small infestations were observed near Stump Lake, Harper Ranch in the South Thompson River Valley, Spences Bridge, and at Kinsmen Beach near Vernon.

In 1955, several silver poplar trees in Victoria were again defoliated. About 30 shade trees of the same species were almost completely defoliated at Comox. Collections: Coast 10, Interior 33.

***Douglas-fir Tussock Moth,*** *Hemerocampa pseudotsugata* McD.—A 4-acre stand of open-grown Douglas fir trees near Cascade was fairly heavily infested by the Douglas-fir tussock moth. The upper quarter of the crowns of the majority of trees were almost completely defoliated. A virus disease greatly reduced larval numbers during the late instars.

A light infestation occurred at Olalla Creek near Keremeos in the Kamloops Forest District, but defoliation was not noticeable. Egg counts indicate that the Olalla infestation may increase in 1956. Collections: Interior 12.

***False Hemlock Looper,*** *Nepytia* sp.—There was a slight decrease in the population density of the false hemlock looper in the Interior. This looper was found in association with the spruce budworm in the Lillooet drainage area. The population level, although higher than in 1954, was still low. Collections: Coast 21, Interior 75.

***Larch Sawfly,*** *Pristiphora erichsonii* (Htg.).—No larch sawflies were found on western larch in 1955. Very light infestations occurred on eastern larch near Cluculz and Pantaga lakes and in swamps along the northern section of the Hart Highway, Prince George Forest District. Collections: Interior 4.

***Pine Needle Scale,*** *Phenacaspis pinifoliae* (Fitch).—This scale insect was again abundant on ponderosa pine trees between Oyama and Penticton. Pine stands near orchards were most heavily infested.

***A Pine Root Weevil,*** *Hypomolyx piceus* (DeG.).—Larvae, pupae, and adults of this weevil were taken on the roots and root collar of western white pine trees at Mackinson Flats near Arrowpark. Although relatively few specimens were collected, a high percentage of trees 4- to 12-inches D.B.H. have

been attacked, presumably by this weevil, during recent years. A number of pine stems, 2-inches D.B.H. and less, have been killed.

***Poplar and Willow Borer,*** *Sternochetus lapathi* (L.).—This weevil continued to attack willow in the Bull River and Cherry Creek areas, Nelson Forest District. Dead stems outnumbered live stems at these two localities.

***Large Aspen Tortrix,*** *Choristoneura conflictana* (Wlk.).—The large aspen tortrix caused about 50 per cent defoliation of the trembling aspen trees between Mileposts 20 and 30 of the Beaten River Road. The infestations between Mile 80 and Mile 140 on the Alaska Highway decreased in intensity. Heavy defoliation was general in aspen stands in the Salmon River area north of Prince George; defoliation ranged between 75 and 90 per cent. Collections: Interior 8.

***Ugly-nest Caterpillar,*** *Archips cerasivorana* (Fitch).—Larvae of this species severely defoliated choke cherry bushes for a distance of 1 mile alongside highway No. 95 north of Invermere Junction. Collections: Interior 3.

***Aspen Leaf Miner,*** *Phyllocnistis populiella* Chamb.—The aspen leaf miner was abundant over much of the range of trembling aspen. Infestations were heaviest in central and northern British Columbia where it was not unusual for 75 to 100 per cent of the leaves to be attacked.

***A Willow Leaf-miner,*** *Lyonetia saliciella* Bsk.—This leaf miner was again abundant on willow in many parts of the Nelson Forest District.

***Velvet Green Looper,*** *Epirrita autumnata* (Gn.).—A localized light to medium infestation occurred in a stand of overmature alpine fir and white spruce on the Nation River Mine road, Prince George Forest District. Defoliation of most of the infested alpine fir trees ranged between 40 to 50 per cent. These trees have also been severely defoliated by the 2-year-cycle spruce budworm. Collections: Coast 45, Interior 23.

***Striped Alder Sawfly,*** *Hemichroa crocea* (Fourc.).—No damage was reported in the previously affected areas on Vancouver Island and the Queen Charlotte Islands. About 4 acres of alder near Yarrow, Vancouver Forest District, were 95 per cent defoliated. Collections: Coast 2.

## LIST OF CO-OPERATORS

Antonenko, J.
Archer, W. C.
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Bailey, F. S.
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de Hart, D.
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Gavin, H. C. R.
Gibson, C. C.
Gilgan, N. P.
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Gorley, O. J.
Greenhouse, J. G.

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Hammer, R.
Hancock, F. R.
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Hansen, B.
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Henderson, C. L.

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Howard, W.

Jackson, R. C.
Jackson, Wm.
Jaeger, J. F.
Janning, H. A.
Johnston, G.

Kay, T. B.
Keefe, R. R.
Kennedy, W. W.
Killough, J. F.
Kirkendale, E.
Kirkendale, J.
Klees, L.
Knudsen, J.
Kullander, M. O.

Lindstrom, W. C.
Litterick, J. P.
Loogin, R.
Lorentsen, L. H.
Lowe, J. B.

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MacKinnon, J. A.
MacPherson, A.
Mastin, T.
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McDougall, R.
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Mitchell, G. W.
Monaghan, W.
Moore, W.
Morley, K. A.
Morris, D. J.
Mould, J.
Mudge, M. H.
Murray, J.

Neal, R. G.
Neighbor, B.
Neighbor, M.
Neilsen, P.
Noble, J. D.
Norbirg, H. P.

Olson, S.
Ormond, L. D. D.
Osborne, H.
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Petty, A. P.
Prochnau, A.

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Rockwell, T.
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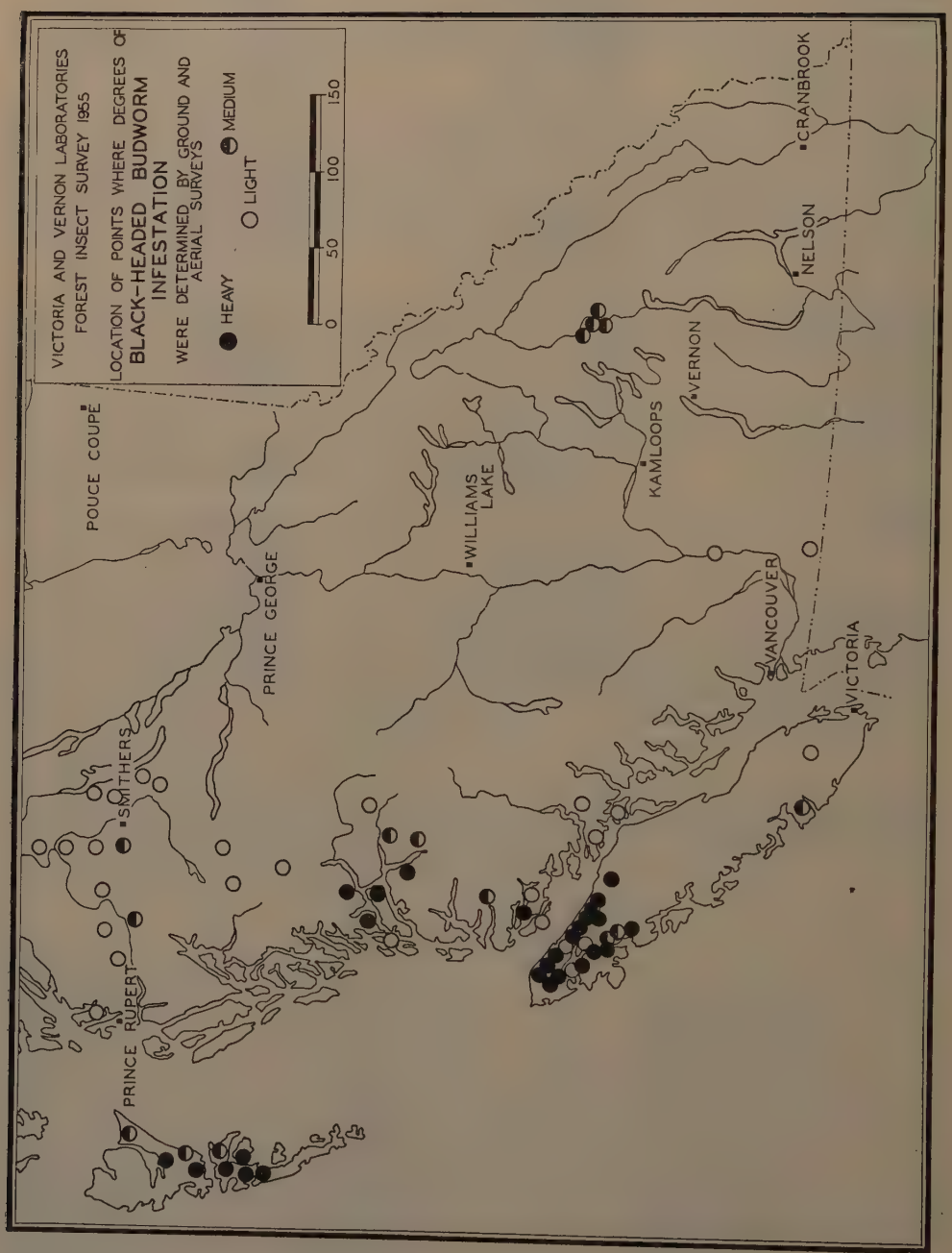
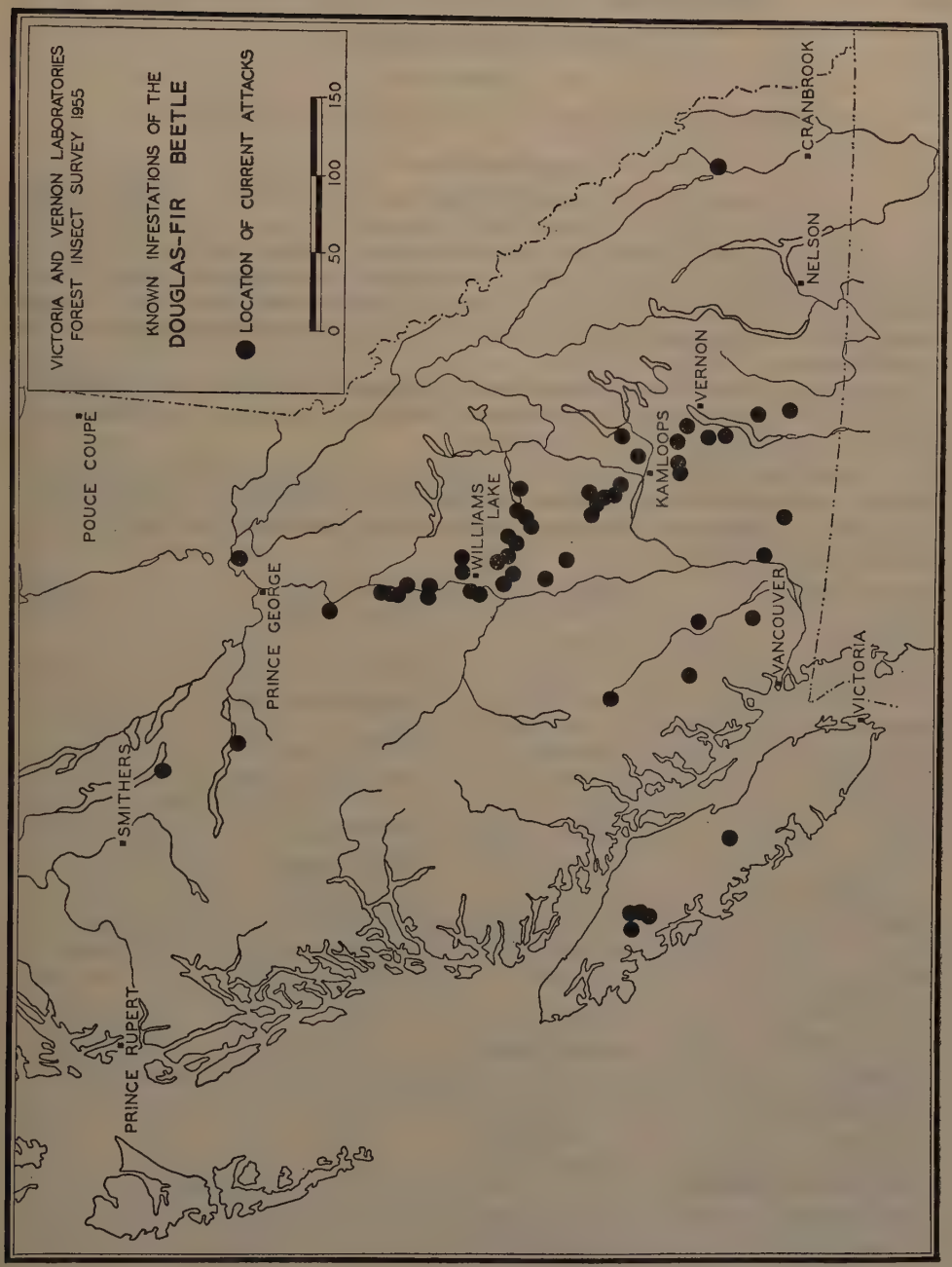
Silke, S.
Simmons, C. F.
Smith, D. R.
Smith, R. G.
Stone, F. B.
Stroud, C. W.

Taft, T. G.
Taylor, H.
Teindle, T. J.
Thomas, R. W.
Tompkins, N. G.
Toochin, J.

Van Tine, L. E.
Van Tine, G. R.
Vivian, R. K.

Wager, J. C.
Waldie, W. F.
Walkley, W. R.
Warren, C.
Wejr, S. E.
White, K. C.
Whitecross, A. F.
Willan, J. H.


VICTORIA AND VERNON LABORATORIES
FOREST INSECT SURVEY 1955
LOCATION OF POINTS WHERE DEGREES OF
BLACK-HEADED BUDWORM
INFESTATION
WERE DETERMINED BY GROUND AND
AERIAL SURVEYS
HEAVY
MEDIUM
LIGHT
0
50
100
150
POUCE COUPE
PRINCE GEORGE
SMITHERS
PRINCE RUPERT
WILLIAMS LAKE
KAMLOOPS
VERNON
NELSON
CRANBROOK
VANCOUVER
VICTORIA


VICTORIA AND VERNON LABORATORIES
FOREST INSECT SURVEY 1955
KNOWN INFESTATIONS OF THE
DOUGLAS-FIR BEETLE
LOCATION OF CURRENT ATTACKS
0
50
100
150
POUCE COUPE
PRINCE GEORGE
WILLIAMS LAKE
KAMLOOPS
VERNON
CRANBROOK
NELSON
SMITHERS
PRINCE RUPERT
VANCOUVER
VICTORIA

# PROVINCE OF BRITISH COLUMBIA

## FOREST DISEASE SURVEY

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### INTRODUCTION

The major efforts of the Forest Disease Survey in British Columbia were again directed towards the collection and appraisal of fungi on living hosts and toward the conduct of surveys of specific diseases. While the total number of collections did not increase, there was an increase in the number of special reports of unusual disease occurrences. In addition, greater effort has been directed toward developing sampling techniques with current emphasis being placed on root diseases.

While a number of collections of fungi designated for national consideration have been received, the previously reported distributions were not changed sufficiently to warrant reporting at this time.

The continued support of the Mycological Unit, Botany and Plant Pathology Division, is gratefully acknowledged, along with the help of other mycologists.

A total of 2,018 collections were submitted to the Survey in 1955, and are listed by host as follows:

| Coniferous trees | Collections | | Broad-leaved trees | Collections |
|---|---|---|---|---|
| Fir— | | | Aspen, trembling | 40 |
| Alpine | 581 | | Alder, red | 14 |
| Amabilis | 77 | | Birch, western white | 12 |
| Grand | 12 | | Willow | 10 |
| | | 670 | Cottonwood, black | 6 |
| Douglas fir | | 485 | Arbutus | 3 |
| Hemlock— | | | Maple, Douglas | 3 |
| Western | 217 | | Maple, vine | 1 |
| Mountain | 3 | | Total | 89 |
| | | 220 | | |
| Spruce— | | | | |
| White | 162 | | | |
| Engelmann | 7 | | | |
| Sitka | 4 | | | |
| Black | 2 | | | |
| | | 175 | | |
| Pine— | | | | |
| Ponderosa | 70 | | | |
| Lodgepole | 58 | | | |
| Western white | 28 | | | |
| | | 156 | | |
| Cedar— | | | | |
| Western red | 43 | | | |
| Port Orford | 25 | | | |
| Yellow | 12 | | | |
| | | 80 | | |
| Juniper, Rocky Mountain | | 8 | | |
| Larch, western | | 3 | | |
| Total | | 1,797 | | |

| | |
|---|---|
| Miscellaneous or host not specified | 132 |
| Grand Total | 2,018 |

## IMPORTANT DISEASES

***Foliage Diseases.***—Infection by needle cast diseases was, on the whole, lighter in 1955 than during the previous year. Needle cast of yellow pine caused by *Elytroderma deformans* (Weir) Darker, was noticeably less common, although there appeared to be more witches brooms which are sometimes associated with this disease. Needle cast of western larch caused by *Hypodermella laricis* v. Tubeuf was recorded as the cause of severe defoliation in a number of areas, but most stands that had suffered heavy defoliation in previous years were almost free from infection. The severe and widespread infections of Douglas fir by *Adelopus* (*Phaeocrytopus*) *gaummannii* Rohde, reported in 1954, were not in evidence in 1955.

Infection by foliage rusts was notably more severe than in previous years. Particularly severe was the needle rust of spruce caused by *Chrysomyxa ledicola* Lagerh. Severe defoliation by this fungus was reported throughout the northern part of the Province, especially on the Queen Charlotte Islands. The foliage rust of alpine fir caused by *Pucciniastrum epilobii* Otth, which had remained at a low level up to 1955 was reported causing severe defoliation in many parts of the Province particularly around Smithers, Prince George, Quesnel and Kamloops.

***Butt Rot of Douglas Fir Associated with Basal Fire Scars.***—A young stand of timber near Courtenay, Vancouver Island was surveyed to determine the reason for the reported high incidence of decay and to identify the associated fungi. The results of the survey strongly emphasize the importance of fire history as an influence on decay loss in young merchantable stands.

The logging history of the area was in doubt but indications were that the stand originated about 120 years ago. It had subsequently been cut over for pit props and other minor products. In addition, the stand suffered at least two damaging ground fires. These disturbances influenced the present stand composition which consists of scattered evenaged Douglas fir, in admixture with western hemlock and western red cedar ranging from 50 to 110 years of age. The understory consisted of cedar, hemlock, grand fir and various hardwoods. The site quality was slightly above average and was characterized by a ground cover of salal, May leaf, and Oregon grape.

The survey showed that the excessive cull was closely associated with basal fire scars which occurred 83 and 59 years ago. Most of the scarring was related to the earlier fire when the fir averaged around 35 years of age. The incidence of basal scarring and the related incidence of decay is summarized in the following table.

**RELATION OF BASAL FIRE SCARS TO BUTT ROT IN DOUGLAS FIR IN A YOUNG MERCHANTABLE STAND NEAR COURTENAY, VANCOUVER ISLAND**

| Plot number | Area (acres) | Total fir | Per cent of fir scarred | Per cent scarred fir with butt rot* |
|---|---|---|---|---|
| 1 | 0·6 | 19 | 74 | 86 |
| 2 | 0·6 | 21 | 71 | 87 |
| 3 | 1·5 | 29 | 41 | 83 |

*Rot positively traced to basal fire scars.

Volumetric analyses were not possible because the timber had been removed previous to the examination but the average diameter of the fir at a one-foot stump height was 28, 27, and 24 inches for plots 1, 2 and 3 respectively. The decay diameters averaged 11 inches for the first two plots and 8 inches for plot 3.

All the rots positively related to fire scars were brown cubical butt rots, mostly caused by *Polyporus schweinitzii* Fries, with a few instances of brown cubical butt rot caused by *Polyporus balsameus* Peck. The latter is a new record on Douglas fir in British Columbia and apparently has only been recorded on this host once previously, in Washington.

***Leader Damage to Douglas Fir.***—An unusual type of leader damage to Douglas fir was recorded in two areas on Vancouver Island, at Bear Creek and in the Nitinat Valley. Toward the end of the growing season, leaders of young trees in stands 10 to 20 years of age were found to wilt and break at the base resulting in multiple leaders and distorted stem development. As many as 50 per cent of the trees had suffered damage from one to eight successive years. Several hundred acres were involved in each of these areas. All affected areas were on very high growing sites with more than 3 feet annual terminal growth being quite common.

Three types of symptoms were found associated with the condition. Most commonly, leaders broke off with little or no necrosis at the base of the current year's growth. In other cases there was marked girdling necrosis at the base of the current year's leader growth killing the leader, which remained erect or broke at the base. Less frequently the necrosis proceeded downward from the terminal portion eventually killing the leader. The latter two types of symptoms also occurred on lateral branches.

The examination of a large number of affected leaders showed that in every case where damage occurred the pith was abnormally large and the cortical tissues were very succulent, whereas the xylem band was extremely narrow or almost non-existent. Undamaged leaders most frequently had a normal width of woody growth. The primary cause of the condition appeared to be mechanical damage stemming from the weak structural development of the rapidly growing leaders. The affected stands had less than normal stocking and were particularly susceptible to damage by wind action.

Further study is required before reliable predictions regarding the long-term effects of the condition can be made. Host vigor was not reduced for laterals quickly took over as leaders and growth in the year following leader damage was not retarded. If this rapid growth does not continue for more than a few years, stem distortion will be rapidly covered over by subsequent diameter growth. Some multiple leaders will persist.

***Root Rot of Douglas Fir.***—A special survey of Douglas fir root rot caused by *Poria weirii* Murr., started in 1954, was continued. A large part of the field season was devoted to developing testing sampling techniques designed to determine if a correlation exists between the occurrence and intensity of root rot damage and site factors.

***Armillaria Root Rot in Immature Forests.***—Root rot caused by *Armillaria mellea* (Vahl ex Fr.) Quel. continued to inflict light mortality in young Douglas fir plantations and natural stands on Vancouver Island. Damage was most evident in stands under 25 years of age, particularly in the Forbidden Plateau area, although even in these stands mortality seldom exceeded one per cent of the stems annually. Other species, which occur in association with fir appeared to be equally susceptible.

Despite the light annual mortality a more detailed evaluation of the problem seems warranted, for frequently the best developed trees in the upper crown

classes are killed and the disease commonly occurs in patches causing localized under-stocking and uneven stem distribution. Permanent sample plot studies, to follow the development of root rot infected stands, may provide the most reliable answers to the questions pertaining to the long-term effects of the disease.

***Late Frost Injury to Arbutus.***—A severe and widespread browning of arbutus foliage in the spring resulted in a large number of enquiries to the laboratory. Damage was recorded throughout the range of the host on the east coast of Vancouver Island, Saanich Peninsula and the adjacent Gulf Islands. The occurrence of browning was patchy and was least apparent at elevations above 800 feet.

The damage was attributed to late frost injury, which occurred during a severe cold spell in March following an unusually mild winter. Fortunately there was very little injury to buds and by late summer, when most of the necrotic foliage had been cast, most of the trees appeared quite normal. Aside from a minor amount of twig dieback there should be little or no permanent injury.

***Wind Damge.***—An unusually severe windstorm coupled with heavy rainfall in June caused extensive blow-down and wind breakage from Nelson to north of Revelstoke in the Slocan, Arrow Lakes and Kootenay valleys. While the total volume of blow-down is not known it is evident that salvage problems will be considerable. In many areas, root rot caused by *Poria weirii* Murr. contributed materially to the incidence of blow-down. In the Nakusp area a large proportion of the windthrown trees on a timber sale were badly weakened by root rot.

***Disease Conditions in Forest Nurseries.***—There was very little post-emergence damping-off at the Green Timbers and Campbell River nurseries during the past season. It is probable that the late sowing at these nurseries helped to reduce mortality by damping-off fungi.

At Duncan there was approximately 11 per cent post-emergence damping-off and from 8 to 11 per cent late damping-off.

As in past years the Cranbrook Nursery suffered its greatest loss from damage to emerging seedlings by birds, which this year amounted to nearly 50 per cent. While observations by the nursery staff suggest that there was little post-emergence damping-off, bird damage prevented an accurate measure of disease loss.

## OTHER NOTEWORTHY DISEASES

(V. I.=Vancouver Island; Q. C. I.=Queen Charlotte Islands)

| Host | Organism | Locality | Remarks |
|---|---|---|---|
| Alder, red..... | *Cylindrosporium alni* Darn. & Barth. | Union Bay, Sooke, V.I... | Causing leaf spot. First herbarium record. |
| Fern, ostrich..... | *Uredinopsis struthiopteridis* Stormer | Aleza Lake..... | Causing balsam fir needle rust. First record for western N. America west of Alberta. |
| Fern, sword..... | *Milesina vogesiaca* P. & H. Sydow | Southern V.I..... | Balsam fir needle rust. Only records for N. America outside of Oregon. |
| Fir, alpine..... | *Pucciniastrum epilobii* Otth | Central and southern interior regions of B.C., particularly Smithers and Osoyoos. | Balsam fir needle rust. Reported for the first time (in 1955) to reach locally epiphytotic intensity. |
| | *Bifusella sp.*..... | Aleza Lake, Smithers.... | An apparently new species causing disease to the living needles of balsam firs. |

OTHER NOTEWORTHY DISEASES (concluded)

| Host | Organism | Locality | Remarks |
|---|---|---|---|
| Fir, amabilis..... | *Limacinia alaskensis* Sacc. & Scalia..... | Kitimat; Cowichan Lake Forbidden Pateau, V.I. | Sooty mold fungus, causing damage to foliage of western red cedar, Douglas fir, grand fir, and particularly amabilis fir. Ref: Can. J. Bot. 33: 501-505. 1955. |
| Fir, Douglas..... | *Melampsora occidentalis* Jacks. | Wherever the two alternate hosts, Douglas fir and black cottonwood, occur together. | Common and occasionally causing considerable defoliation. Clearly distinguishable from *Melampsora albertensis* on Douglas fir. Ref: Can. J. Bot. 33: 177-188. 1955. |
| | *Rosellinia herpotrichioides* Hepting & Davidson | Duncan, V.I..... | Causing a needle blight of seedlings in forest nursery. |
| | *Valsa abietus* Fr..... | Westbank..... | Found associated with dieback. First herbarium record. |
| Fir, grand..... | *Cenangium atropurpureum* Cash & Davidson | Courtenay, V.I..... | Found associated with dieback, apparently new record of host and distribution in western N. America. |
| Mistletoe, dwarf... | *Septogloeum gillii* Ellis... | Parksville, V.I..... | Hyperparasite of *Arceuthobium campylopodum* Engelm. f. *tsugensis* (Rosend.) Gill, growing on lodgepole pine. |
| | *Wallrothiella arceuthobii* (Peck) Sacc. | Radium Hot Springs..... | Hyperparasite of *Arceuthobium americanum* Nutt. growing on lodgepole pine. |
| Spruce, Sitka..... | *Chrysomyxa monesis* Ziller | Massett, Q.C.I..... | A recently discovered and newly described rust causing damage to spruce cones Ref.: Can. J. Bot. 32: 432-439. 1954. |
| Willow..... | *Diatrype bullata* (Hoffm.) Fr. | Campbell River, Royston, V.I. | Associated with dieback. First herbarium record. |

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